LIQUIDITY PREFERENCE THEORY:
ITS RELATION TO MANUFACTURING CORPORATIONS

BY

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One of the basic functional relationships of Keynes' liquidity preference theory is an inverse relationship between the demand for money balances and the rate of interest. However, since Keynes' work, a large body of literature has evolved bearing on the appropriate interpretation of his theory and the liquidity preference demand for money in general. These alternative interpretations are important because they reflect the sort of real-world phenomena which the theory attempts to explain.

One body of theory restricts the analysis to asset exchanges among fixed-claim financial assets in a world characterized by a state of constant expectations. An alternative theory extends this analysis to include the choice of assets with a residual claim against future income in a world of variable expectations. The approach to liquidity preference theory suggested in this alternative encompasses dynamic phenomena falling within the purview of expectations such as regressive pulls, extrapolative pushes, shocks, and the diminution of the slanting of certain prospects as opinions in group situations reinforce one another.

The data for manufacturing corporations were examined with respect to two hypotheses to ascertain which of the two liquidity preference theories best explains the liquidity preference decisions of these firms. Specifically, the question examined is whether during the 1960s and early 1970s one can best account for the manufacturing sector's contribution to a rise in aggregative velocity by (1) a movement out of cash into the liabilities of intermediaries or government securities or (2) a movement out of cash and non-cash liquid assets in general in an effort to increase the stock of instrumental capital. The results from the analysis of the data for the manufacturing sector provide support for the second mode of adjustment. Moreover, these results suggest that expectational phenomena concerning changes in the flow of income to instrumental capital are manifest in the financial adjustments of these firms.

CHAPTER 1

INTRODUCTION

1.1 Objective

One of the central differences in the liquidity preference literature concerns the sort of balance sheet adjustments one expects to observe on the part of individuals and business firms as market rates of interest change. One body of theory restricts the analysis to asset exchanges among fixed-claim financial assets in a world characterized by a state of constant expectations [50].[1] This analysis has been extended to include the choice of assets with a residual claim against future income [52]. The essentially limiting feature of this theory is that the state of expectations is treated as a constant. Another body of theory [10, Chs. 7, and 11] views asset exchanges as those between fixed-claim and residual-claim assets in a world characterized by a state of variable expectations.

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[1] The fixed-claim asset is one which produces a constant and contractual income flow over the life of the asset, e.g., the debt obligations of the United States government. Alternatively, a residual-claim asset is one which produces a variable income flow (e.g., the plant and equipment of a manufacturing corporation) in the sense that income varies and the assets in question are in effect credited with a portion after allowance for the fixed claim.

Historically, the idea of fixed and residual claims has been associated with the liabilities and equity claims of a corporation in terms of its claims to the income generated from assets. One can, however, credit the fixed- and residual-claim assets with the income.

There are implications in these alternative views of liquidity preference theory for the practice of central banking. The theory with expectations constant leads to a supply-oriented position that the monetary authority may control interest rates by controlling the supply of money and hence directly influence the level of aggregate spending employment and production. The liquidity preference theory with variable expectations leads to a demand-oriented view of interest rate determination. Here factors affecting the state of expectations--including past, present, and prospective changes in monetary aggregates--exercize more influence over the level of interest rates, production, and employment. It is important that monetary authorities base their actions on the theory that provides the closest representations to the real world. For example, if the latter theory is correct, monetary authorities' attempts to lower interest rates by accelerating the growth of the money stock may be frustrated by expectational phenomena and, in fact, lead to increases in interest rates and capital expenditures by business firms [11, Ch. 15, and appendix to Ch. 15].

This study presents some evidence with regard to the balance sheet adjustments of manufacturing corporations in response to changes in market rates of interest and the state of expectations. Hopefully, this evidence will provide some additional insight into which of the two monetary theories best explains the behavior of this important group of firms in the economy.

Specifically, the study examines empirical evidence concerning two hypotheses which help describe the behavior of manufacturing corporations:

(1) A rise in the market rate of interest is related to a rise in velocity and a form of switching at the margins from cash into marketable bonds, such as government securities.

(2) A rise in the market rate of interest is related to a rise in velocity and a form of switching at the margins from both cash and government securities into other classes of assets, such as plant and equipment.

Alternative liquidity preference theories emphasize either effects stemming from interest rate changes with expectations constant or effects stemming from changes in the state of expectations. The hypotheses are derived from the two theories and are manifest in alternative interpretations of the empirical evidence of manufacturing corporations.

The hypotheses imply the existence of a negative relationship between the demand for money balances and market rates of interest and are consistent with the empirical evidence of the type initially introduced by Latané [35; 36]. This evidence consists of a strong positive association between the income (or sales) velocity of money and market rates of interest.[2] However, the interpretation of this evidence is varied in terms of the chain of causation linking interest rate and velocity movements. Latané originally concluded [35, p. 124] that it was not possible empirically to determine the chain of causation. But later [36, pp. 446-448] he adopted a modified transactions demand approach whereby the chain of causation runs from interest rate movements to velocity movements because of an exchange between money and bond-type (or fixed-claim) financial assets. In still later work Latané's position is unchanged [37, pp. 332-336].

The empirical evidence offered in relation to alternative explanations for the velocity interest rate association is reviewed and analyzed in a number of places [e.g., 10, Chs. 5, 7, and 9; and 11, Chs. 4, and 6]. Some studies [e.g., 14, 15, 39, 9, 33, 34, and 42] examined sectorial data for particular institutional groups, whereas other studies [e.g., 39, 3, 40, and 22] examined aggregative data for the entire economy. Differences arise in the results of these studies due to a failure in some cases to distinguish between levels, say, of liabilities, and rates of growth, especially in relation to rates for income and surrogates for income such as sales and the tendency to draw conclusions about the trend in the liquidity of non-financial corporations, without actually examining the data on liquidity except for the liabilities of intermediaries [e.g., as in 39 and 22].[3]

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[2] The income velocity of money is the ratio between an income flow per time period and the average stock of money available during this time period. Latané regressed velocity (or its inverse) on the interest rate (or its inverse) and found a high positive correlation coefficient in both regression forms. Latané also found a high positive association when the variables were interchanged with interest rates regressed on velocity.

T. H. Lee [39], for example, examined aggregative data for the whole economy and ran regressions of the real-money stock per capita (the actual money stock divided first by an index of prices and then by the total population) on a weighted average of past incomes per capita and the yields on varius financial assets in an effort to ascertain which financial assets are the closest substitute for money. Lee concluded that

> It is quite evident through these successive tests that saving and loan shares are the closest substitute for money among time deposits, short-term paper, long-term bonds, and equities. [39, pp. 1174]

Using similar data, Chetty [3] found that commercial bank time deposits are the closest substitute for money, and others question the entire adequacy of these studies [e.g.,

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[3] Financial intermediaries are financial institutions with an intermediate position between the ultimate savers and users of funds, e.g., insurance companies, savings and loan associations, commercial and investment banks, and so on. In this intermediary sense the liabilities of a savings and loan association, say, are sources of funds to the association and uses of funds for the holders of the liabilities. The liabilities are assets for the holders.

11, Ch. 6].[4] However, in neither of these studies is recognition given the prospect that the results may change markedly if data for a sector such as manufacturing corporations are analyzed. These corporations do not hold savings and loan shares as a part of their asset portfolios as a routine matter, and yet they hold a sizable share of money balances. However, Shatto and Stern [47] report that non-financial corporations have increasingly substituted certificates of deposit for governments during the 1960s. They further report that the cyclical movement of non-money liquid assets is such that it suggests a movement out of (into) cash and into (out of) non-money financial assets during cyclical expansion (contraction) and thus accounting for velocity movements. This finding is examined in greater detail in Sec. 5.2.

With respect to the financial adjustments of manufacturing corporations, Frazer [17] has reported as a first approximation that a regression of the sales to cash ratio (a surrogate for the corporate manufacturing sector's contribution to the income velocity, ratio for the whole economy) on yields on high grade corporate bonds produces a positive relationship between velocity and interest rates. He has further reported that a regression of the ratio of non-cash liquid assets to bank loans (another potential source of funds on short notice) on the bond yields fails to reflect increases in non-cash liquidity as interest rates rise. The 1953-66 period of rising interest rates exhibited a rising sales-to-cash ratio for the manufacturing sector and a decline in non-cash sources of liquid funds in relation to sales and/or total assets [17, pp. 87-88]. In addition, an analysis of average growth rates during this period revealed an average annual growth rate for cash balances of 2.2 per cent, whereas government securities declined by an average of -0.7 per cent. Frazer interprets these results and others [15, and 11, Ch. 15] as suggesting that during periods of rising interest rates manufacturing firms draw down their holdings of cash balances and non-cash liquid assets and/or increase bank loans in relation to sales or asset size in an attempt to facilitate an expansion of instrumental capital.

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[4] Lee [40], in a comment on Chetty's work, reran Chetty's equations with some modifications and found, again, that savings and loan shares are the closest substitute for money.

Lee [38] argues that Frazer's regression of liquidity ratios on interest rates may produce spurious results due to an a priori negative correlation between the market value of government securities and market rates of interest. For example, a reduction of 50 per cent in the rate of interest on an outstanding long-term bond would result in approximately a 100 per cent increase in the market value of the long-term bond. It is argued later (Sec. 4.4) that this problem does not follow in the case of the balance sheet data of manufacturing corporations.

The idea that one may explain the velocity interest rate association by expectational phenomena--expecially as it relates to non-financial corporations--involving actual and planned flows of capital expenditures is rejected out of hand by some analysts. For example, Culbertson states with reference to Friedman's luxury goods hypothesis (and therefore, by implication his greater certainty hypotheses) that

> The luxury goods argument applies only to individuals, and not to the businesses, institutions, and governmental units that hold most of the nation's money.[5] [4, p. 299]

Further, Jeffers and Kwon state that

> Since 75%-85% of corporate holdings of U.S. Governments have less than one year to maturity, it hardly seems reasonable to believe that decisions to purchase plant and equipment are reviewed concomitantly with decisions concerning desired adjustments in holdings of cash and near-cash assets. Ignoring plant and equipment is consistent with our view that government securities are primarily held as a "buffer stock" of assets . . . providing coverage of possible gaps between current cash inflows and anticipated and unexpected cash outflows. [29, p. 913]

The luxury goods hypothesis in the language of consumption theory says that the demand for money balances rises more than in proportion to the stock of wealth (or total assets) and is offered by Friedman and Schwartz [21] as means of explaining the pre-World War II secular decline in velocity.

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[5] This is in direct contrast to Friedman's own view as expressed with Schwartz since they are explicit about their analysis bearing directly upon manufacturing corporations [21, p. 639; p. 654, n. 12].

In the post-World War II years, as velocity underwent a secular rise, Friedman suggested that the luxury goods hypothesis was still operating, but that greater certainty of the future has contributed to the rise. However, a part of these cash outflows are anticipated expenditures on plant and equipment. Funds may be accumulated in advance of actual capital expenditures and held temporarily in the form of non-cash financial assets. In this context, and contrary to the view of Jeffers and Kwon, desired adjustments in securities holdings may be reviewed by comptrollers and financial managers as capital expenditure plans are made by others.

The points to be made by the selected references to the empirical works relating to alternative views are threefold. First, some studies (e.g., those of Lee and Latané) arrive at conclusions which are far too broad, considering the data actually examined. Second, other works (e.g., those of Jeffers and Kwon, and Culbertson) reject some of the notions found in the liquidity preference literature without actually examining either the relevant literature or data. Third, the theoretical foundation for the empirical studies of Lee, Latané, Jeffers, and Kwon, and Shatto and Sterns is found in orthodox liquidity preference theory. However, an alternative liquidity preference theory by Frazer suggests that the financial adjustments of particular institutional groups (and hence their contribution to the aggregative income velocity of money) depend upon the special needs of institutional groups. These special needs arise from both the asset and liability sides of the balance sheet and are founded upon considerations derived from expectational phenomena.

1.2 Data and Methods of Analysis

The empirical contribution of this essay is limited to an analysis of the liquidity preference decisions of manufacturing corporations during the time period 1960-72. The data are those provided by the United States Federal Trade Commission and the Securities and Exchange Commission (FTC-SEC) for manufacturing corporations arranged by asset size. A total of nine asset-size categories are considered. The data are also analyzed for the separate time periods of 1960-64 and 1965-72.

The arrangement of the data by the asset size of firms allows for possible differential reactions of these firms as changes occur within the economic environment. Specifically, the larger corporations are expected to be more highly characterized by the planning of their financing with the view to dealing with unforeseen developments and avoiding the effects of unfavorable credit conditions [10, pp. 202-212; and 12]. Any differences between the large and small corporations of the sort suggested should be reflected on the balance sheets of these firms as changes occur within the economic environment.

The data are analyzed for two periods to allow for possible differential reactions of these firms to inflationary expectations and changes in the flow of capital expenditures. Specifically, the general economic environment changed from one of rapid expansion in employment and production with stable interest rates and prices in the first half of the 1960s to one of rapid expansion with rising interest rates and prices in the second half of the 1960s and early 1970s.

CHAPTER 2

LIQUIDITY PREFERENCE THEORY: ALTERNATIVE VIEWS

2.1 Introduction

Keynes [32] devoted considerable attention to the liquidity preference demand for money. One of the basic functional relationships of Keynes' liquidity preference theory as expressed by Tobin [50, p. 65] is "an inverse relationship between the demand for cash balances and the rate of interest." The asset holder is viewed as switching between two asset aggregates, cash (i.e., money) and bonds, whereby a rise (decline) in the interest rate induces a move out of (into) money into (out of) bonds. The monetary authority is, then, viewed as controlling the rate of interest by controlling the supply of money.[1] An increase (decrease) in the money supply lowers (raises) the rate of interest and induces the form of asset switching between money and bonds posited above, all on the ceteris paribus assumption of a constant state of expectations.

Since Keynes' work, a large body of literature has evolved bearing on the appropriate interpretation of his theory and the liquidity preference demand for money in general.[2] Leijonhufvud interpretes the liquidity preference theory of Keynes and that of the Keynesians to be quite dissimilar. In particular, Leijonhufvud distinguishes between the interpretation of the money and bonds asset aggregates of Keynes' and Keynesian liquidity preference theory. These alternative interpretations are important because they reflect the broad theoretical considerations determining the aggregative structure of the theory and the sort of real-world phenomena which the theory attempts to explain [41, p. 143]. Further, the alternative interpretations serve as a frame of reference for viewing polar extremes in the liquidity preference literature. These extremes are such that, on the one hand, liquidity preference is viewed as an asset exchange between the means of payment and other fixed-claim financial assets [50] and, on the other hand, as an asset exchange among the entire spectrum of assests [41, pp. 371-373; 27, pp. 794-795; 26, pp. 30-31; 11]. Aside from the special role of inelastic expectations in Keynes' theory,[3] Frazer has been critical of liquidity preference theory in general in terms of its failure to capture essential aspects of the relation between the money stock and the rate of interest mainly arising from changes in expectational phenomena. Frazer [11] offers a revision of Keynes' theory which incorporates effects arising from changes in the state of expectations. Leijonhufvud's distinctions between Keynes and the Keynesians and Frazer's revision of Keynes' theory are discussed further below.

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[1] Tobin [50, p. 69] for example refers to a schedule indicating what the quantity of money must be in order for the monetary authority to establish a particular interest rate.

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[2] Leijonhufvud [41] and Johnson [30] provide interpretations of Keynes' theory as distinct from Keynesian theory. Although far from a homogeneous doctrine, Keynesian theory (or the income-expenditure theory) is summarized by the Hicks-Hansen IS-LM apparatus as found in most macroeconomic textbooks of the 1960s and early 1970s [e.g., 6, 4, and 48].

[3] Tobin [50, p. 70] cites Fellner as criticizing Keynes' theory in terms of the special role of inelastic expectations as they attach to interest rates but not to

2.2 Some Alternative Views

The alternative views considered center around the mode of balance sheet adjustments one expects to observe in the context of liquidity preference theory. The composition of the asset aggregates in the theory is especially important in the context of an analysis of the balance sheet adjustments of particular institutional groups, e.g., manufacturing corporations. This follows from the fact that the balance sheets of different institutional classes of firms are quite dissimilar. For example, both the assets and liabilities of manufacturing corporations are

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other variables. Leijonhufvud [41, pp. 377-382] presents an analysis of the role of expectations in Keynes' theory as compared with the interpretation given to it by Fellner. He concludes that there is no asymmetry in Keynes' theory. There are perfectly inelastic expectations in all markets. In any event, Tobin has successfully demonstrated [50] that an inverse relation between interest rates and the demand for money does not depend upon a state of perfectly inelastic expectations.

quite different from those of savings and loan associations.[4] As of year-end 1969, financial assets (i.e., cash, government securities, and receivables) represented only 23.4 per cent of the total assets of manufacturing corporations, whereas physical assets (i.e., inventories and plant and equipment) represented 62.8 per cent of total assets after allowance for depreciation (Table 2.1). Alternatively, the assets of savings and loan associations at the year-end 1969 date were almost entirely fixed-claim financial assets (Table 2.2). The total of cash, mortgages, and securities represented 93.2 per cent of the total assets of these institutions, with mortgages alone accounting for 86.3 per cent of total assets. The physical assets of these enterprises were contained in the other asset category which was only 6.8 per cent of total assets.

A further difference between manufacturing corporations and savings and loan associations is revealed by the liability side of their balance sheets. The primary obligations of manufacturing corporations are long-term obligations to creditors and to the owners of the enterprise. Together these obligations accounted for 71.3 per cent of the total of liabilities, at year-end 1969. The most significant short-term obligation was trade credit and other advances, and it accounted for only 12.3 per cent of total liabilities.

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[4] Emphasis of this study is on the balance sheet adjustments of manufacturing corporations. Savings and loan associations are considered here only for the purpose of comparison and are not dealt with later.

TABLE 2.1

The Balance Sheet for All Manufacturing Corporations: Fourth Quarter 1969

Assets	Per Cent of Total Assets		Millions of Dollars
Cash		4.4	23,754
Government securities		1.2	6,783
Receivables		17.8	96,538
Inventories		23.2	126,229
Other current assets		3.6	19,776
Plant and equipment	74.6		
less depreciation reserves	35.0		
Net plant and equipment		39.6	215,291
Other non-current assets		10.2	55,342
Total assets		100.0	543,712
Liabilities and Capital			
Short-term bank loans		4.5	24,604
Trade credit and advances		12.3	66,451
Current Installments on long-term debt		1.4	7,184
Other current liabilities		6.9	37,296
Non-current Long-term dept		16.7	90,694
Other non-current liabilities		3.7	20,365
Capital stock		18.7	101,875
Earned surplus		35.9	195,240
Total liabilities and capital		100.0	543,712

Source: Quarterly Financial Report for Manufacturing Corporations, Federal Trade Commussion and the Securities and Exchange Commission, Fourth Quarter 1969.

TABLE 2.2

The Balance Sheet for All Saving and Loan Associations: December 1969

Assets	Per Cent of Total Assets	Millions of Dollars
Cash	1.5	2,443
Mortgages	86.3	140,169
Securities	5.4	8,715
Other assets	6.8	11,026
Total assets	100.0	162,353
Liabilities		
Savings deposits	83.5	135,494
Reserves	6.9	11,176
Borrowings	6.0	9,783
Loans in process of collection	1.5	2,426
Other liabilities	2.1	3,474
Total liabilities	100.0	162,353

Source: Federal Reserve Bulletin, December 1969.

The liabilities of savings and loan associations were, by comparison, nearly all in the form of short-term obligations to depositors. Saving deposits accounted for 83.3 per cent of the total liabilities of these enterprises, at the 1969 date.

However, these proportions do not reflect the more important difference in these institutions in terms of liabilities that reflect decision making as compared with those that are routinely tied to some other variable. For one, in the case of manufacturing corporations, once the terms and conditions of trade credit are determined, volume depends primarily upon sales, not conscious decision making. For another, savings and loan shares are determined by the savings plans of the public. With interest rate ceilings, as during the post-World War II years, variation in this liability depends partly upon forces beyond the control of the management of savings and loan associations. For manufacturing corporations, bank loans (both long and short) represent the liability most directly subject to management control, at least in the short run. Bank credit provides a source of funds on short notice to meet unforeseen contingencies. In addition, lines of credit can be arranged in advance, say, of an anticipated reduction in the supply of funds due to a restrictive monetary policy. The point is that manufacturing corporations--especially the larger ones--may plan their state of liquidity by exercising control over key assets and liabilities. These key accounts are cash, government securities, and bank loans.

The proper management of these accounts can provide the managers of these enterprises, among other things, a supply of short-term funds necessary to facilitate an expansion of their productive capacity.

Liquidity preference theory as it has evolved from Keynes is not well suited to an analysis of manufacturing corporations. This is due to the restrictive asset structure of the theory with an emphasis on an asset exchange between cash balances and other fixed-claim financial assets and the constancy of expectations in the theory. This theory--termed Keynesian theory--is better suited for an analysis of financial institutions, e.g., savings and loan associations, although the constancy of expectations would remain at odds with the real world. In particular, the assets of manufacturing corporations such as plant and equipment have in effect a residual claim on the earnings of the enterprise. This return stream may rise or fall from one period to the next. More importantly, expectations may be formed with respect to the prospective earnings of these assets, e.g., as when commodity prices are expected to rise. Depending upon the nature of these expectations, the managers of manufacturing corporations may form a preference for changes in the proportions of the various assets (i.e., for differential rates of change in the respective categories). The decisions would be decisions to hold more or less residual-claim assets relative to fixed-claim assets in line with the asset exchanges called for by Hypothesis 2 (Section 1.1). The assets of savings and loan associations are primarily assets with a return stream which is contractual and constant. The return stream does not change over the life of the asset--except the purchasing power of the return varies inversely (directly) with the rate of inflation (deflation). Admittedly, management may form expectations concerning the return streams of new issues of fixed-claim assets and, in the absense of restrictive regulations, the managers of these enterprises would be faced with a decision concerning their present asset portfolio and the new issues of fixed-claim assets forthcoming on the market. The managers, in any event, are making decisions between fixed-claim assets on essentially an average maturity margin. Some of the assets currently held may be sold (possibly at a loss) and new issues purchased. The managers may, for example, exchange short-dated assets (including cash) for long-dated assets in line with the asset exchange of Hypothesis 1 (Section 1.1).

Keynes' versus Keynesian liquidity preference theory. The primary deficiency of Keynes' theory as an explanation of real-world events is the constancy of expectations in the theory. However, the Keynesians have modified Keynes' theory so as to limit still further the real-world content of the theory.[5] In particular, Leijonhufvud [41, pp. 146-147] intreprets Keynes' money aggregate as consisting of assets of two asset classes--one with a short time to maturity and low interest rate elasticity of present value and a second consisting of long-term assets (fixed-claim and residual-claim) with a high interest rate elasticity of present value.[6] He interprets the Keynesian money aggregate as consisting of mediums of exchange and the bond or second aggregate as consisting of fixed-claim financial assets. Further, Leijonhufvud [41, pp. 354-355] notes a general tendency in the Keynesian literature for the bond aggregate to shorten in its average time to maturity. Consequently, liquidity preference theory in these works becomes a theory which attempts to explain the portfolio choice between money (i.e., the means of payment) and close money substitutes (e.g., Treasury bills).

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[5] A detailed review of the differences between Keynes' and Keynesian theory is not provided. Emphasis is given

The constancy of expectations[7] in both Keynes' and Keynesian theory means that"the same interest rate is

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to the alternative asset structures of the two bodies of theory based upon Leijonhufvud's detailed analysis of Keynes' and Keynesian theory [41].

[6] This interpretation of Keynes' asset aggregates is shared by Tobin [51], Hicks [26, Ch. 2], and Friedman [19]. However, Tobin [50] does not include physical capital in his own long-term asset aggregate.

Leijonhufvud actually uses the terms physical and financial non-money assets, although the discussion is in terms of uncertainties of prospective return streams. Emphasis in these passages is on the prospect that changes of money prices of commodities would change the relation of the real values of these assets.

[7] Constant expectations is represented in the theory by a fixed marginal efficiency of capital schedule. The

applied to calculating the present value of bond-streams and equity-streams. "The interest rate is therefore an (inverse) index of the money price level of non-money assets" [41, p. 135]. However, the rate of interest cannot be determined from knowledge of the prospective returns to assets for the following reasons:

> The income per unit of a given type of capital good at a given time will depend on the aggregative stock of such goods in existence at that time. The quantity that will exist in the future depends on the current rate of net investment which, in turn, depends on the current market price of such goods. [41, p. 139]

The source from which the rate of interest is ascertained is Keynes' theory of liquidity preference and the interest rate corresponds to the time to maturity of the representative long-term asset [41, p. 172]. In Keynes' theory this interest rate is determined by the relative supply of short-dated versus long-dated assets in general; whereas in Keynesian theory this interest rate is determined by the relative supply of money and short-dated non-money assets.[8]

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marginal efficiency of capital is "that rate of discount which would make the present value of the series of annuities given by the returns expected from the capital-asset during its life just equal to its supply price" [32, p. 135]. The schedule of the marginal efficiency of capital is downward sloping in Keynes' theory [41, p. 139] due to differences in the time profiles of the return streams of various asset classes. It is in this sense that Keynes' interest rate theory is a theory of the term structure of interest rates [41, pp. 355-356].

[8] There are also implications with respect to the term structure of interest rates involved here. Leijonhufvud [41, pp. 355-356] suggests the Keynesian literature implies that the interest rate is a short-term rate with long-term

Leijonhufvud [41, pp. 174-175] suggests that Keynes' short-run analysis in terms of constant expectations led Keynes to statements which imply that the interest rate is determined solely by the supply and demand for money--in the Keynes or Keynesian sense. However, these implications are due to the simplified two-asset structure of the General Theory. While one may certainly focus on the demand for money vis-à-vis the demand for near-money assets (and fixed-claim assets in general) as in Keynesian theory [e.g., 50 and 48], there is a risk on the part of the analyst:[9] "[T]he yield on the system's stock of physical capital and the 'real forces' of productivity and thrift recede so far into the background that they may be forgotten" [41, p. 359].

The dependency of the rate of interest on the yield on the system's stock of physical capital may be demonstrated by the use of Leijonhufvud's standard income streams (i.e., a constant income stream of one certainty--equivalent dollar per year running for T years).[10] Further, as Leijonhufvud

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rates being determined by the current short rates and market expectations about the future course of short-term rates. This is in contrast, in his view, with keynes' consistent focus upon the long-term rate as the pivotal rate in the structure of rates, with short-term rates regarded as significant in so far as their movement affects long-term rates. The significance of the different views is thought by Leijonhufvud to be in the general focus of the theory toward the short or the long end of the maturity spectrum.

[9] It is not meant to suggest that all analysts using the Keynesian IS-LM apparatus consider the interest rate as determined solely by the supply and demand for money. Such an implication is certainly not found in Mundell's use of this apparatus [44] or in the analysis of portfolio selection and economic growth of Foley and Sidrowski [8].

has stated,

> This "standard Stream" thus defines the unit quantity need for the supply and demand analysis of asset prices. Knowledge of the value of "the" interest rate is tantamount to knowing the market price of this "unit stream." The second factor, Keynes' marginal efficiency of capital, then serves to define the number of such unit streams that entrepreneurs expect from reproducible physical sources. The number of unit streams per capital good and the value which society puts on a unit stream together determine the demand price of capital goods. [41, pp. 172-173]

In other words, the interest rate is determined by the intersection of the IS and LM curves in Keynesian analysis, not by the intersection of the supply and demand for money. Further, it is only in the state of perfectly inelastic expectations (i.e., a fixed-marginal-efficienty-of-capital schedule) that changes in the interest rate may be attributed to changes in the supply of money and an asset exchange among money and non-money financial assets.

Neither Keynes' nor Keynesian theory is well suited for an analysis of asset preferences whenever the relative money value of the return streams to residual-claim and fixed-claim assets is expected to change. This is because both theories rely upon the building block of a simple inverse relationship between interest rates and the money value of assets. This simple inverse relationship strictly

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rate on government bonds is the riskless rental value of money [18, Ch. 4]. Other rates of return differ from this riskless rate by some risk element. Further, the cost of capital can be viewed as consisting of a risk element plus the riskless rental value of money. Alternatively, a rate of return may be reduced to some certainty equivalent (i.e., something equivalent to the rate on government securities). What has been said about rates may be said also about the flow of returns or stream of returns.

holds for all assets when expectations are constant. For example, expectations concerning an increase in the flow of income to residual-claim assets (i.e., a rightward shift of the marginal efficiency of capital schedule) may result in a rise in market rates of interest. In such a setting, the money price of residual-claim assets would be expected to rise relative to the money price of fixed-claim assets. The change in the relative asset prices would produce a preference for residual-claim assets over fixed-claim assets due to an increase in the money value of the return streams of the former class of assets relative to the latter class of assets. It seems especially likely that the primary holders of the nation's stock of productive capital, i.e., manufacturing corporations, would reduce their stores of liquid assets in an effort to facilitate an expansion of their productive capital. An evolving body of literature rejects the assumption of constant expectations and revises Keynes' liquidity preference theory along lines different from those of the Keynesians in an effort to capture influences emanating from changes in the state of expectations. This revision of Keynes' theory is most relevant to the study of manufacturing corporations.

A revision of Keynes' theory. The approach to liquidity preference theory suggested in this alternative encompasses dynamic phenomena falling within the purview of expectations, such as regressive pulls, extrapolative pushes, shocks, and the diminution of the slanting of certain prospects as opinions in group situations reinforce one another.[11]

Pull effects refers to attractions toward some subjectively viewed normal rate of change or level of economic variables such as income and interest rates. Push effects are the direct influence on expectations of the thrust of current changes. Shock effects are due to factors operating outside the usual economic theory, such as statements about crises and major policy changes by the central bank or executive branch of government. The diminution of the slanting of opinions pertains to the interpersonally controversial character of some decision and is discussed in more detail later (Sec. 3.2). In the present alternative, the common hyperbolic curve depicting the demand for money, interest rate relationship may be explained by assigning probabilities to the prospect of a rise or fall in bond values in relation to a safe or normal rate of interest. Over time, both push and pull effects are present in this theory of liquidity preference. These points are discussed further following some comments on the meaning of the safe or normal rate of interest.

The subjectively viewed normal rate of interest is interpreted [14] as a probabilistic concept as it was initially offered by Keynes [32, pp. 201-202].[12] The basic idea is that in a world where interest rates and security prices vary inversely one of three events may occur with respect to future changes in interest rates and security values. The value of securities may rise, decline, or undergo no change with reference to prevailing values and interest rates. Given that over the course of time interest rates tend to vary over a reasonably narrow domain (e.g., from 2 per cent to 9 per cent) as a historical matter, individual expectations and the aggregate of individual expectations are viewed as operating in an environment where some level of interest rates and security values is considered as normal or safe. As current market rates depart from this norm,

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[11] The term dynamic does not refer to the mere passage of time in the context of the present discussion. Dynamic phenomena result from changes in the state of expectation.

> one could reason that . . . individuals and markets assign probability weights varying from zero to one to the prospect of a decline in security values and conversely. . . . And, further, the probability of present rates prevailing in the future should vary from zero at the extremes to some maximum probability less than unity in the neighborhood of the normal rate of interest. [14, p. 71]

The normal rate of interest is defined as that rate of interest which is assigned (in a subjective sense) the greatest probability of no change. The normal rate of interest, of course, is not exactly observable, but it may be thought of as some underlying secular trend for the rate on long-term government bonds (or for this riskless rate plus some risk premium in the case of other long-term rates).

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[12] In the following discussion reference is made to the normal rate of interest, but it should be borne in mind that the reference is actually to an average over time, say, of the long-term rate on government securities, as subjectively viewed by behavioral or decision-making units. The concept of an average interest rate over time is further discussed in another section.

The effects of both push and pull effects may be introduced in the form of an adaptive expectations model with reference to this underlying trend rate. For example, the average rate of interest for a particular time series, such as that for long-term government bonds, may be viewed as

$$i_e = f(W_o i_t + W_1 i_{t-1} + \cdot \cdot \cdot + W_n i_{t-n}), \qquad (1.0)$$

where the i's are interest rates and the W's are weights.[13] The pull effect is toward the normal rate and the push effect is exerted by the direction of change in the more recent current rates. In this context, when the pull effect shifts in relation to the push effect, greater weight is given to rates in the more distant past, as would be consistent with the idea of the safe rate as an average of past rates.

In Keynes' and the Keynesian analysis, as in the present context, the demand for money is viewed as being directly related with income and inversely related with interest rates. A fundamental difference is that the present alternative includes explicit recognition of interrelationships between such variables as interest rates and income levels and these relationships are explained in terms of forces falling within the purview of expectations (e.g., regressive pulls and extrapolative pushes). For example, when interest rates are low (e.g., during the downturn of the business cycle) relative to their normal level there is a regressive pull for rates to return to their normal level. In such cases interest rates are expected to rise and the value of fixed-claim assets are expected to fall so that there is a movement out of bonds into other assets in order to avoid capital losses. As this exchange occurs there is also a regressive pull of income and spending to some extrapolated precontraction rate of change. Further, as income rises, so does the rate of return to residual-claim assets in general so that a stimulus is given to a movement out of bonds and money into residual-claim assets as in the case of an expansion of instrumental capital by manufacturing corporations. As the economic recovery continues, the thrust of current events (i.e., push effects) may also result in a revaluation of the weights assigned to separate interest rates in the calculation of the subjective normal rate of interest so that the normal rate may increase as well.

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[13] The reason for writing the function in the present form where the rates and their weights are summed is that the weights themselves are subject to variation as explained below.

Additionally, the thrust of current events may result in a shift of the demand for money function. For example, it is argued that as certain institutional groups (e.g., manufacturing corporations) increase in asset size there is a reduction in the demand for money in relation to income and total assets due to a variant of the precautionary motive [16, pp. 591-495; 15].[14] A reduction in the demand for money function due to extrapolative pushes in the face of rising interest rates would mean that the preference for money balances and other fixed-claim financial assets would weaken relative to the preference for an expansion of instrumental capital. Further, accelerations in the rate of growth of the money supply which lead to expectations of increases in the average level of commodity prices would produce expectations of increases in interest rates and further weaken the demand for money balances. The net effect of these changes on the interest rate depends upon the interaction of the money supply, income, and price-level changes.

A relationship between the nominal rate of interest[15] and rates of change of the real money supply ($1/M' \cdot dM'/dt$), rates of change of real income flows (1/Y' · dM'/dt), and rates of price-level change (1/P · dP/dt), where P = price level, M' = M/P, Y' = Y/P, may be expressed in a linear form as[16]

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[14] There are two salient features of the precautionary motive as interpreted by Frazer [10, p. 69]. These features result from (1) contingencies requiring sudden expenditures or unforeseen opportunity and (2) a desire to hold assets, the value of which is fixed in terms of money, to meet a subsequent liability fixed in terms of money. It is the latter feature which is most relevant to the present discussion.

[15] A nominal rate of interest is equal to rate of return

$$i = d + d_1 \frac{1}{M'} \frac{dM'}{dt} + d_2 \frac{1}{Y'} \frac{dY'}{Y'dt} + d_3 \frac{1}{p} \frac{dP}{dt}. \qquad (2.0)$$

Gibson and Kaufman [25] estimate equation (2.0) for the post-World War II period. Their principal findings support the contention of a complex interrelation among variables as suggested above. In particular, the effect of income changes was found to have a stronger and more robust[17] effect on interest rates than changes in the money supply [25, pp. 474-476]. Only when time deposits were included as a part of the money supply was the money supply coefficient of the "expected" negative sign as suggested by Keynesian liquidity preference theory. Gibson and Kaufman further reported:

> These findings do not deny that money or credit affect interest rates inversely. Rather, they suggest that the influence of money and credit may be too brief to be identified clearly in monthly observations. Thus even in such short periods, the dominant influence on interest rates appears to come through the real sector. [25, p. 478]

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to productive capital in dollars of constant purchasing power plus inflationary premium and the usual risk elements.

[16] The introduction of the rate of price-level change as an argument follows from the empirical results of Yohe and Karnosky [56] and Gibson [23; 24].

[17] Changes in the definition of the money supply and changes in the lags of the variables changed the coefficient of the income variable less than they changed the coefficient of the money supply variable.

In other words the short-run over which expectations are constant may be too short to be statistically observable in most available data series.

Drawing upon the notion of probability slanting as developed by Fellner [7], Frazer [11, Ch. 8] offers an explanation for shifts in the decisions weights of equation (1.0) and turning points in business conditions generally.[18] The basic idea of Fellner's, as utilized by Frazer, is that the probabilities (decision weights) of decision makers may be viewed as slanted or distorted probabilities. These decision weights result from the slanting of genuine subjective probabilities in instances where the decision maker's probability judgments are shaky or interpersonally controversial.[19] The slanting expresses an allowance for the possible non-monetary consequences of acting upon such shaky or interpersonally controversial degrees of belief.

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[18] Fellner [7, pp. 5-8] offers a concise statement of the essentials of his probability slanting approach to the theory of decision making. Subjective or Bayesian probabilities are a blending of probability judgments based upon the idea of a convergent relative frequency of events with probability judgments based upon hunches and ignorance concerning events. Neo-Bayesian decision theory [7, p. 56] combines Bayesian ideas with utility theory, and a reasonable individual is viewed as maximizing "the probabilistic expectation of the utility of wealth to him, and thus his probabilistic expectation of the utility of the potential consequences of the acts he is considering." Also see Fellner [7, pp. 210-233] for an annotated bibliography on neo-Baynesian decision theory and related works.

[19] The decision weights are not true probabilities since the true probabilities (i.e., values which adhere to all the rules of probability theory) are slanted to form the decision weight. Further, the decision weights do not adhere to all the rules of probability theory. Fellner describes this approach to decision theory as semiprobabilistic [7, pp. 48, 77-78, 82, and 160-162].

With regard to the functional form of slanting inclination, Frazer relies on two propositions due to Fellner:

> [1] slanting inclinations will diminish (though they will not disappear) as the decision maker gets used to being faced with some specific type of decision problem;
>
> [2] slanting inclinations will dininish (though they will not disappear) wherever larger groups of like-minded individuals are formed. [7, p. 8]

The first of these propositions allows for the opportunity of learning from experience and the second allows for the influence of group behavior on the decisions of individuals. Or to put the matter differently, the first allows for doubt in the mind of the individual and the second allows for disagreement among individuals. As either or both of these sources of doubt diminish so will the slanting inclinations of the individuals. Based upon Fellner's second proposition, Frazer [11, Ch. 8] deduces an explanation for the turning points in business conditions generally. (For a discussion, see Sec. 3.2.)

In terms of probability slanting inclinations, this turning-point principle suggests that as opinions coalesce there is less uncertainty, opinions become reinforcing, and weights shift to favor pull effects over push effects. The decision weights assigned to the more distant past, as in the adaptive expectation function (1.0), are larger, and the decision weights assigned to the recent past are smaller--

all such that turning points occur.[20] In other words, viewing i_e in equation (1.0) as a surrogate for business conditions a peak (through) in the variable i_e will occur.

2.3 Summary

The review of some of the different views found in the liquidity preference literature provides a perspective with respect to Hypotheses 1 and 2 of the introductory chapter. To repeat, Hypothesis 1 calls for a form of asset exchanges between fixed-claim and residual-claim assets in general as market rates of interest change. In either case there is the prospect of a negative relationship between the demand for money and market rates of interest. There are differences in the explanations for this negative relationship in terms of the sort of balance sheet adjustments one expects to observe as market rates of interest change and as changes occur in the state of business conditions generally. The various adjustments are as follows:

(1) A rise in interest rates calls for switching from cash to non-cash forms of highly liquid assets in relation to total assets because of the inducement provided by the higher interest rates. (The theories from which this notion follows treat expectations as a constant.)

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[20] The analysis is also thought to apply to the term structure of interest rates [49] and to the behavior of averages of stock market prices [11, Appendix to Ch. 8].

(2) Assets vary mainly as to time to maturity or length of life, such that a rise in interest rates causes a decline in the demand price for capital goods and other long-dated assets relative to short-dated assets. This prospect causes an overall stronger preference for short-dated assets. (Here the short run over which these changes occur is defined as the run over which expectations are constant, and interest rate changes involve notions about the term structure of interest rates.)

(3) Interest rates change and changes in the financial structure of non-financial firms occur in part in response to changes in expectations--given the prospect that prospective price-level changes, as well as some others, have differential impact on fixed-claim as distinct from residual-claim-type assets (e.g., cash and bond holdings as distinct from plant and equipment). (Here there is the view that other changes occur, but that those operating via expectations predominate.)

The first of these adjustments is based primarily upon Keynesian liquidity preference theory as found in most macroeconomic textbooks.

The second of the foregoing adjustments follows from Leijonhufvud's interpretation of Keynes' explanation of the demand for money, interest rate relationship. This explanation involves a distinction between the rate of return on additional capital (stated at its supply price) and the rate of interest. The higher rate of interest is thought to reduce the demand price relative to the supply price. However, in the light of the significance of the empirical relationship between price-level changes and interest rates a question arises; namely, does the rate of interest vary independently of the rate of return to instrumental capital? There is, more generally, the question of how the central bank controls the rate of interest, say, without affecting prospective streams of returns from the various classes of assets. Consequently, one may ask, what about the validity of the role attributed to the central bank in this case?

The third of the foregoing adjustments is based primarily upon Frazer's work. The basic distinction in Frazer's theory and that of Keynes and the Keynesians is that the short run over which expectations are constant is allowed to go to zero. This permits changes in the state of expectations to take on paramount importance in the theory. Drawing upon analysis due to Fellner, Frazer introduces the notions of semiprobabilistic behavior and probability slanting into the theory of liquidity preference. The slanting in question is reflected by a change in the decision weights assigned to the prospective return stream of an asset. A reduction in the slanting of these decision weights is interpreted by Frazer as a reduction in the subjectively viewed risk that this prospective return stream will in fact materialize as time passes. These slanting motions are in addition structured in the context of an adaptive expectations function and related to turning points in business conditions.

These alternative modes of adjustment are manifest in the alternative hypotheses labeled 1 and 2 of the introductory chapter. Adjustment 1 seems to lead most directly to Hypothesis 1, whereas Adjustment 3 seems to lead most directly to Hypothesis 2 in terms of the balance sheet adjustments one expects to observe on the part of individuals and business firms as market rates of interest change. An integral part of Hypothesis 2 is the prospect that influences operating via changes in the state of expectations may affect interest rates and the return streams of residual-claim assets in the same direction. It is Frazer's theory which leads most directly to Hypothesis 2 as an explanation of the asset adjustments of economic units (e.g., non-financial corporations) in the face of changes in the state of expectations. In this theory changes in the state of expectations are viewed as the driving force behind the asset and liability adjustments of economic units. Furthermore, changes in market rates of interest are viewed as consequences of these changes in expectations rather than as initiating forces. In this context, a distinction between assets with a constant return stream (e.g., bonds) and assets with a

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residual claim against future income (e.g., plant and equipment) is of paramount importance.

CHAPTER 3

THE CASE OF MANUFACTURING CORPORATIONS

3.1 Introduction

This chapter is devoted to an analysis of the liquidity preference decisions of manufacturing corporations. A liability structure for these firms is introduced in which cash holdings, bank loans, and non-cash, marketable-type liquid assets are interrelated (Sec. 3.2). A low level of bank loans as a liability relative to total assets, sales, or income is said to be a source of liquidity somewhat similar to that provided by the holdings of non-cash liquid assets. In addition, planning of capital expenditures and the liquidity structure of firms is said to be related.

The approach taken to the study of liquidity preference lies in the realm of positive economic theory.[1] From that point of view, a theory used to explain the liquidity preference decisions of manufacturing corporations should be structured in such a way that it may account for the asset and liability preferences of these institutions as reflected by their balance sheets (Sec. 2.2). In other words, the theory should be pinned down empirically, and the ties to the balance sheet are one way of doing this.

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[1] Positive theory in economics is theory about economic behavior, whereas normative theory provides rules or prescriptions for proper behavior or decision making such as Markowitz rules for portfolio selection [43].

An analysis of liquidity preference may proceed on the basis of ideas concerning portfolio objectives. Overall there are other objectives to portfolio management besides liquidity, all of which are to be fulfilled simultaneously. There is, for example, the hedging objective and the liquidity objective as suggested by Terrell and Frazer [49]. In addition one may identify an income objective and a stability-of income objective. The hedging objective [49, p. 1] is essentially a means of increasing the certainty of the availability of funds on prescribed terms for meeting an anticipated need for funds. The liquidity objective [49, p. 1] follows from the uncertainty in relation to the time period over which funds are available for acquiring assets. The combination of the hedging and liquidity objectives [49, pp. 5-6] results in a desire to hold short-term financial assets which is an extension of the precautionary motive for holding money balances. In this context, the precautionary motive is interpreted as applying to a general class of assets rather than solely to money. The basic idea is that a portfolio will be selected in an attempt to satisfy these objectives simultaneously. Further, the ranking of the portfolio objectives is subject to change as changes occur in the economic environment. For example, at times when there is a strong expectation of an increase in the sales of manufacturing corporations it seems reasonable that the dominant portfolio objective may be one of accumulation of inventory and an expansion of the stock of productive equipment. The liquidity objective may be moved down the list of priorities relative to the income objective in such a setting, except that in the early stages of a capital boom or expansion--as where income and interest rates are expected to rise--liquidity may be built-up to assure the future availability of funds on known and favorable terms.

A breakdown of the assets and liabilities of manufacturing corporations in terms of their contributions to liquidity (L) and income (Q-C) is given in Table 3.1, where Q-C represents gross income (Q) minus carrying costs (C).

TABLE 3.1

An Arrangement of Assets and Liabilities in Terms of Their Income and Liquidity Yields

	Inflows		Outflows	
	Q-C	L		L
Cash (i.e., money balances)	o	+	Bank loans	-
Government securities, and similar non-cash liquid assets	↓	↑	Bonds and mortgages	↓
Instrumental capital (inventories, plant and equipment)	+	o	Capital stock	o

The ranking of assets and liabilities in Table 3.1 is such that money balances and short-term financial assets represent the greatest (least) source of liquidity (income) and instrumental capital offers the greatest (least) source of income (liquidity) on the asset side of the balance sheet. On the liability side of the balance sheet, short-term funds may be obtained at the least cost but involve the greatest drain on the liquidity as compared with long-term sources of funds. The cost of long-term funds is usually greater than short-term funds, but their liquidity drain is less than that of short-term funds.

This breakdown of flows of returns into elemental parts is one way of recognizing the intangible qualities of liquidity and risk and of viewing the ranking of accounts on a balance sheet. Frazer has used it [13] in drawing and embellishing on Keynes [32, Ch. 17]. In his more recent analysis, as outlined in Section 2.2, the dollar flows of returns (e.g., Q-C) get probability weighted to reflect the liquidity and risk aspects, and the L column is removed from Table 3.1. These weights may be denoted P(Q-C) to indicate the probability of receiving the dollar flow or for otherwise adjusting for the security and convenience of holding a particular asset. A probability weight of unity, as in the case of money, is certainty (no risk) and represents perfect liquidity. As certainty declines and/or risk increases, the weights decline toward zero.[2] These weights are, moreover, subject to revision depending upon changes in the state of expectations concerning the relative certainty with which one may expect to receive enlarged (or reduced) income flows from particular assets.

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[2] The notion of liquidity as a probabilistically weighted concept is consistent with Hicks' view [27] of the meaning of the term "liquidity" in Keynes' theory. In Hicks' view

In view of the foregoing notions of probabilistically weighted yields, a rather broad concept of liquidity emerges. Namely, one may view liquidity as a direct function of the relative certainty with which a flow of funds may be forthcoming adequate to meet future contingencies (both foreseen and unforeseen).[3] For example, during a period of economic expansion with expectations and decision weights shifting in the direction of greater certainty concerning an enlarged flow of income from instrumental capital, including its liquidity yield, manufacturing corporations could increase liquidity (broadly viewed) by increasing their stock of

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the term "liquidity" in Keynes' theory is such that the liquidity of an asset is a function of its current price and its expected future price. In the light of what has been said earlier concerning the prospect that an expectation of an increase in the average of commodity prices may produce an enlarged flow of income to residual-claim assets, this view of liquidity means that these assets may also be viewed as generating an enlarged liquidity yield in such settings.

[3] This broad view of liquidity differs from the somewhat mechanical view of liquidity, for example, as a ratio of cash plus governments to bank loans. Such liquidity ratios are termed by Hicks as accounting measures rather than economic measures [27, p. 794]. More importantly, a strict reliance upon such ratios reflects a preference for certainty (i.e., probability values of unity) such as that pertaining to the liquidity yield of cash balances. Empirically, the term "liquidity" as used in this essay is nevertheless taken to be a ratio such as that of cash plus governments to bank loans.

instrumental capital. In such a context and after the initial stages of an expansion, one would expect to observe a reduction in such liquidity ratios as the ratio of cash plus governments to bank loans in that funds are used to facilitate an expansion of instrumental capital.

3.2 A Theory of the Balance Sheet of Non-Financial Corporations

Based upon the assumptions that the managers of non-financial corporations are rational (i.e., capable of ordering their preferences) and prefer to manage more rather than fewer assets,[4] a theory of the balance sheet of non-financial corporations may be constructed.[5] The objective of the managers is taken to be one of utility maximization in an effort to allow for certain non-monetary factors in decision making, such as an attitude toward risk and the controversial nature of some decisions. Consequently, consideration is given to the prospect that the decision weights assigned to the near-term and far-term elements of an income flow to a residual-claim asset may be viewed as slanted or distorted probabilities. In addition, utility is derived from the assets held, depending upon their income yield, carrying cost, and liquidity yield, as brought forth in Section 3.1. In turn, the expected income flow from an asset is affected by such utility considerations in the context of probability slanting.

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[4] It is further assumed that the managers possess the ability to rank the assets according to their utility yield in an ordinal sense. The axiomatic foundation for the theory is outlined by Frazer [11, Ch. 8].

[5] The theory in this section draws heavily upon the theoretical speculations of Frazer [10, pp. 193-199; 11, Ch. 8].

The theory involves in a sense three sets of equilibrium conditions, as traditionally noted in the literature. The first concerns the choice of assets subject to the constraint of total assets. The second concerns the choice of alternative means of obtaining funds subject to a constraint. The third concerns an investment-demand equilibrium in combination with the previous two sets of equilibrium conditions. The utility function to be maximized, $U(M,G,I,K)$, is assumed to be an increasing function of total assets, notably: money (M); government securities and other short-term financial assets (G); inventories (I); and plant and equipment (K). The utility function is maximized subject to the constraint of total assets, $g(M,G,I,K)$. The solution to this constrained maximization problem constitutes the first set of equilibrium conditions. Its Lagrangean function is

$$L(M,G,I,K,r) = U + r(g_\circ - P_m M - P_G G - P_I I - P_K K), \tag{3.0}$$

where r is the Lagrangean multiplier and the subscripted P's are per unit prices of the respective assets. The first-order condition for a constrained maximum of U may be expressed as

$$\frac{\partial U/\partial M}{P_M} = \frac{\partial U/\partial G}{P_G} = \frac{\partial U/\partial I}{P_I} = \frac{\partial U/\partial K}{P_K} = r\,. \tag{3.1}$$

Equation (3.1) represents an equality between the ratios of the return streams (all as utilities from acquiring additional assets in the respective categories) and their respective prices per unit. In this context, the r's corresponding to each of these ratios represent the rate of return for each asset class. In equilibrium these rates of return are all equal.[6]

The second set of equilibrium conditions involves the dual to the maximization problem, namely, a cost minimization problem. The mathematical problem is to minimize the disutility function U(T,B,S) representing an outflow of funds as a function of short-term loans (T), long-term loans (B), and equity issues (S). This function is minimized subject to the constraint of the total outflow, g(T,B,S). For liabilities or sources of funds, the Lagrangean function is

$$L(T,B,S,i) = U + i(g_{\circ} - P_T T - P_B B - P_S S), \tag{4.0}$$

where i is the Lagrangean multiplier and subscripted P's are the per unit prices of the respective sources of funds. The first-order condition for a constrained minimum of U may be expressed as

$$\frac{\partial U/\partial T}{P_T} = \frac{\partial U/\partial B}{P_B} = \frac{\partial U/\partial S}{P_S} = i. \tag{4.1}$$

---

[6] Equality among the r's is in terms of utility flows to the asset holder. This does not mean that observed market rates of interest would all be equal.

Equation (4.1) represents the ratios of the marginal disutility of acquiring funds from the various sources to the per unit prices of the sources. In this context the i's may be interpreted as the rate of interest or cost in terms of the disutility of obtaining funds from the various sources. In equilibrium the cost of obtaining funds is the same for all sources since there are special allowances for their drains on liquidity.[7]

Equations (3.1) and (4.1) represent the stock equilibrium conditions for assets and liabilities with respect to a balance sheet. That is, given total assets, the asset composition which maximizes total utility is that which equates rates of return. Also, given total liabilities, the composition of liabilities is such that the disutility of the outflow of funds is minimized. This occurs when the costs (expressed as rates) for obtaining additional funds from the various sources are equal.

The theory thus far has treated the asset and liability sides of the balance sheet separately. These separate treatments need to be brought together for the simple reason that assets may be increased by acquiring funds through the capital markets. These sources of funds are represented on the liability side of the balance sheet. In the case of manufacturing corporations, funds are acquired in the capital markets for the purpose of acquiring additional instrumental capital (i.e., inventories and plant and equipment). As firms expand in this way, their preferences for other assets and liabilities are likely to be affected. The asset and liability sides of the balance sheet are brought together by the condition whereby the rate of return is equal to the rate of interest.[8]

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[7] Again, the equality is in terms of the ratios of utility flows to unit prices and does not mean that the observed market cost of all funds would be equal.

Managers would be induced to vary the flow of expenditures on instrumental capital depending upon either of two sets of imbalances. As an analytical convenience, these may be stated as: (1) an imbalance between the demand price (CV) and the contractual supply price (C) of instrumental capital or (2) an imbalance between the rate of interest (i) for discounting the prospective returns (R) from instrumental capital and the expected rate of return (r) for relating the prospective returns to the supply price of the capital.[9] These relationships are given by the usual discounting formulas as

$$CV = \frac{R_1}{(1 + i)} + \frac{R_2}{(1 + i)^2} + \cdot \cdot \cdot + \frac{R_n}{(1 + i)^n} \qquad (5.0)$$

and

$$C = \frac{R_1}{(1 + r)} + \frac{R_1}{(1 + r)^2} + \cdot \cdot \cdot + \frac{R_n}{(1 + r)^n}. \qquad (5.1)$$

---

[8] There are implications here as well for the term structure of interest rates. The equality of r and i actually represents an equilibrium structure of rates. See Frazer [10, p. 197] and Frazer and Yohe [18, pp. 371-375].

[9] The reference to an analytical convenience arises

Given the equalities $r = i$ and $CV = C$, imbalances simply symbolize an expansion of business conditions (e.g., $CV>C$, or $r>i$) or a contraction (e.g., $C>CV$, or $i>r$).[10] Further, an inequality may be used, for example, to denote the expansionary influences of an increase in the investment tax credit to business firms which results in an upward revision of the R_1 in equations (5.0) and (5.1) and in r in equation (5.1). Where such governmental actions shape the outlook for business generally, however, the action should have some simultaneous influences on market rates of interest, at least as the effects work themselves out, possibly with some distributed, but varying, lag.

The influence of semiprobabilistic behavior and probability slanting may be incorporated in the above structure. The slanted or distorted decision weights of portfolio managers enter through their affect on the expected return streams of assets. The relationship between the slanting of decision weights and the prospective return stream of an asset may be readily demonstrated if the element of time preference is ignored in equation (5.0). The demand price of the asset (CV), becomes

$$CV = R_1 + R_2 + \cdot \cdot \cdot R_n. \tag{5.2}$$

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because for the most part, in analyses involving expectations (e.g., an expected rate of change in prices), the rate of interest and the rate of return are simultaneously affected.

[10] The actual motivating force is an inequality between ratios in the present and those expected to prevail in the future.

Furthermore, the elements of the return stream (i.e., the R's) of equation (5.0) may be interpreted [11, Ch. 8, pp. 10-13] as expected monetary values (EMV's) such that

$$(EMV)_1 = P_1 (R_1) + P_2 (\bar{R}_1)$$
$$(EMV)_2 = P_3 (R_2) + P_4 (\bar{R}_2)$$
$$\vdots$$
$$(EMV)_n = P_{n+1}(R_n) + P_{n+2}(\bar{R}_n), \qquad (5.3)$$

where $P_1, P_2, \cdots P_{n+2}$ are slanted probabilities (or decision weights) assigned to R_i and $\bar{R}_k$ $(i=1,2,\cdots n)$ and $\bar{R}_i$ represents the nonoccurance of the return stream R_i.[11]

The decision weights assigned to the prospective return streams (i.e., the R's) may be interpreted as an indication of risk. The basic proposition is that in situations where there is considerable (little) doubt concerning the maintenance of the current return stream of an asset, or the judgment is interpersonally controversial (uncontroversial), the decision weights assigned to the R's ($\bar{R}$'s) would be slanted relatively more than the decision weights assigned to the $\bar{R}$'s (R's) of equation system (5.3). The slanting of decision weights due to the interpersonally controversial nature of decisions follows form Fellner's proposition (2) presented earlier in Section 2.2. A central idea is that corporation managers wish to remain corporate managers. Situations wherein the members of the group of equally well-informed corporate managers exhibit considerable disagreement concerning the course of future events may be interpreted by the separate managers as professionally hazardous situations.[12]

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[11] The separate slanted probabilities of a given equation system (5.3) may not sum to unity, although, their undistorted counterparts may sum to unity. See Fellner [7, p. 64] for a discussion of this point.

Care has been taken to avoid any reference to the directional change in the expected rate of return of an asset resulting from changes in the slanting inclinations of decision makers. The directional change in the expected rate of return resulting from expectational changes and the changes in decision weights depend upon the phase of business conditions in which these changes occur. An explanation of the relationship between changes in slanting tendencies and turning points in business conditions involves a more elaborate structure of the return streams to assets (especially those of residual-claim assets) than that provided by equation system (5.3). However, an adaptive expectations function may be utilized to illustrate the manner in which the theory leads to an explanation of turning points. The adaptive expectations function is such that the current income flow (or rate of change in the flow) expected from holding residual-claim assets is assumed to be a function of past income flows (or their rates of change).[13] Stating the expression in terms of rates of change of income flows leads to a possibly more relevant explanation of real-world events than an expression in terms of the levels of income flows. For this reason, and others, an expression in terms of the rates of change of income flows is utilized.[14]

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[12] The degree of slanting for each manager may depend in part upon his personal feeling of independence with regard to his present environment. In this case, the simple idea of risk-aversion as expressed by Tobin [50, pp. 72-74] loses some of its meaning. An interesting alternative concept suggested by Hirshleifer [28, p. 534] is conservative behavior where, according to Hirshleifer, risk-aversion is a special case. For example, a married man with a family would typically own life insurance, whereas a bachelor may rationally not own life insurance. In Hirshleifer's view [28, p. 532], the latter is not a risk-lover but rather the consumption opportunity contigent upon his death does not have the same appeal as it does to the family man.

The expected rate of change of income at the current time ($\dot{Y}_t^e$) is used as a surrogate for expected business conditions. The expected rates of change of income are represented as a weighted average of current and past rates of change as

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[13] See Wallis [54, pp. 771-782] for a review of some of the applications of the adaptive expectations and partial adjustment models in econometric work. An interesting observation of Wallis is that "no theory of economic behavior is usually applied to the specification of the lag profile of adjustment" [54, p. 776]. Fellner's notions of semi-probabilistic behavior--as applied to liquidity preference theory by Frazer--constitute the first stages of an attempt to fill this void.

[14] A cyclical analysis of an economic time series in terms of the levels of the variable is subject to difficulties due to an underlying trend of an exponential type in most time series for stock and flow quantities. The difficulty is that current cyclical lows may be higher than previous cyclical highs. An analysis in terms of rates of change may overcome this problem. In terms of rates of change, a cycle is viewed as a period wherein the variable increases first at an increasing rate and then at a decreasing rate or vise versa.

$$\dot{Y}_t^e = W_o\dot{Y}_t + W_1\dot{Y}_{t-1} + W_2\dot{Y}_{t-2} + \cdot\cdot\cdot + W_n\dot{Y}_{t-n}, \qquad (6.0)$$

where W_s ($s = 0, 1, 2, \cdot \cdot \cdot \cdot n$) are decision weights (or slanted probabilities) assigned to current and past rates of change of income flows. Based upon the notions concerning probability slanting, the decision weights of equation (6.0) are themselves variables and depend upon the state of expectations. In the present context [11, Ch. 8],

> as opinions about a turn in business conditions coalesce, the weights for the terms in the more distant past are slanted less relative to those in the more recent past; i.e., the regression pull toward a more normal state overwhelms the push effect of the more current state in its influence on the expected rate of change in income.

Furthermore,

> As opinions about a change in the direction of business conditions coalesce, turning points in business conditions occur. [11, Ch. 8]

That is, any rate of change of income (or state of business conditions) is sustainable as long as its sustenance is not questioned by decision-making units as a whole. If, for example, the current rate of expansion of economic activity is high relative to some subjectively viewed historical norm, there is reason to question its sustenance based upon past experience. As the questioning occurs and opinions among decision-making units coalesce and become reinforcing, turning points occur and ensuing adjustments follow.

The changes in the adaptive expectations framework can also be shown to have counterparts in that concerning the discounting of prospective returns. Greater certainty in the former case contributes to the greater influence of a more distant past or underlying trend. The greater the influence of the relevant past, the stronger its influence on the future. In the case of discounting prospective returns, the greater certainty about returns in the near future manifests itself in terms of larger probability weights for those returns, but greater certainty in terms of turning points and a redirection of business conditions manifests itself in terms of smaller or larger probabilities, depending on the anticipated direction of the turn.

The following discussion relates the theory of probability slanting, portfolio objectives, and turning points to the short-term financial structure of manufacturing corporations. Mature corporations are looked upon as being characterized by planning, both with respect to liquidity and capital expenditures. This is in part significant because it imparts a different pattern of time difference between financial actions and those of capital investment [11, App. to Ch. 15] in such a context. Starting at a low level of economic activity, liquidity (e.g., as indicated by the ratio between short-term financial assets and short-term liabilities) is built up as funds flow into manufacturing corporations. These funds are held in bank deposits, used to purchase short-term financial assets, and used to pay off bank loans. Planned capital expenditures are built up at a slower rate, deferred, and are generally at a low level. Expectations are revised upward due to past experience, due to autonomous acts of the monetary authority (e.g., an increase in the rate of increase of the money supply), or due to other exogenous forces. The decisions weights for rates of growth for the more distant past are slanted less, and those of present low rates of growth are slanted more in equation (6.0) as opinions among individuals coalesce. Paralleling these improved prospects are increases in prospective flows of returns and consequently an increase in the expected rate of return to capital in equation (5.1).[15]

As these events occur, there will be increases in the cost of funds, i.e., the nominal interest rate (i) of equation (5.0), arising from various sources. For one, the factors influencing prospects and expansion in the real-goods sector are also influencing the outlook in the financial-markets sector, according to analysis by Frazer [11] and Terrell and Frazer [49]. For another, historically at least, an acceleration in the growth of bank credit and money stock has been thought to have contributed to the prospect of higher prices and thus to increases in the nominal rate of interest, as market participants adjust interest rates upward in anticipation of repayment with low-purchasing-power dollars [11, Chs. 1, 5, 10, and 17]. The cost of funds also may rise due in part to an unwillingness of the monetary authority to increase the supply of funds as rapidly as the demand for funds increases.

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[15] In the IS-LM framework these events would be reflected by a rightward movement of the marginal efficiency of capital schedule.

Due to the increase in the expected rate of return to capital, the level of planned capital expenditures increases on the part of manufacturing corporations. The ensuing increase in actual capital expenditures is financed by reductions in liquidity such as may have resulted from the accumulated retention of earnings and possibly from the issuance of new debt and equity instruments. Furthermore, there is a tendency for the portfolio objective of liquidity as measured by financial ratios to move down the list of priorities and for the income objective to move up on the priority list as an expansionary phase of business activity proceeds. However, all of the above actions would result in both an improved income flow and liquidity flow in the sense of a source of funds necessary to meet future contingencies. During the latter stage of a cyclical expansion, cash and short-term financial assets are expected to decline as a proportion of total assets. Liquidity is no longer built up in anticipation of capital outlays,and needed funds are acquired through a greater reliance on short-term bank loans and other sources of short-term credit, especially by the larger more mature corporations. Inventories and plant and equipment, on the other hand, are expected to increase as a proportion of total assets. The converse set of changes would be expected for the most part during the ensuing period of cyclical adjustment.

3.3 Summary

A theory of the balance sheet for non-financial corporations was presented. This theory provides an explanation for the portfolio adjustments of these institutions in a world of uncertainty, wherein the balance sheet is viewed as satisfying a number of objectives such as liquidity (in the sense of security and convenience) and income. Corporate managers are thought to form a lexicographic ordering with respect to these objectives, in which the most urgent are satisfied first. The priority system assigned to portfolio objectives is itself variable, depending upon the general state of expectations. In essence, the argument is that during periods of cyclical downturn liquidity is built up as capital expenditures are deferred, bank loans are reduced, and funds are accumulated from such sources as depreciation. These funds are held in bank deposits and short-term financial assets, and some are used to reduce indebtedness at banks. In this setting liquidity (in the financial sense) is given a priority ranking over other portfolio objectives. As expectations change (e.g., due to an adaptation of expectations and learning from experience, influences emanating from the monetary or fiscal authority and/or due to dynamics internal to the system of analysis) and slanting inclinations change, the flows of prospective and probabilistically weighed returns from possible additions to instrumental capital generally change.

These foregoing prospects also influence the rate of return for relating the prospects to the capital value (or "demand" price) of instrumental capital. As a result, an analytical imbalance occurs between the rate of return and the rate of interest.

In the case of the upward thrust (or buoyancy in expectations) there is an increase in planned capital outlays, as previously deferred capital expansion plans are implemented. The previously built-up stores of liquidity may serve as a means of partially financing these expenditures, and new external sources of funds may be used to further build up liquidity in anticipation of future needs. There is a general shift in the priorities assigned to portfolio objectives away from liquidity (in the financial sense) toward the income objective. Emergency funds would be increasingly sought from such sources as short-term bank loans (at least by the larger firms). As the expansion of economic activity continues the proportion of short-term financial assets in terms of total assets would decline while the proportion of instrumental capital would increase. Pressures are likely to develop in the financial markets as well, due to an equality of foresight in the real-goods and financial sectors with the result that interest rates rise relative to their preexpansion levels. In large part, the reverse set of events would occur during a downturn in business conditions.

CHAPTER 4

METHODS OF ANALYSIS AND RELATED MATTERS

4.1 Introduction

This study is limited to manufacturing corporations in part because of the availability of quarterly data that are based upon asset size.[1] Overall the analysis of data in this essay follows a simple approach with emphasis on an analysis of rates of change. Admittedly, one cannot identify,[2] based upon a simple analysis of rates of change, the demand for cash (or liquidity more generally) in relation to either theory examined in this essay. Rather, the emphasis is on ascertaining which of the two theories offers a better explanation of financial adjustments of manufacturing corporations in a changing economic environment.

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[1] Quarterly balance sheet data in the FTC-SEC's Quarterly Financial Report for Manufacturing Corporations are given for 9 asset size classes and for firms arranged by industry group. Balance sheet data for large and small commercial banks are reported in the Federal Reserve Bulletin, and the United States Treasury Department's Statistics of Income provides annual data for all non-financial corporations arranged by 10 asset size groups. Otherwise, there is a general lack of data for economic units arranged by asset size, with the possible exception of recent Compustat tapes data.

[2] The identification of structural relations has proven to be especially difficult. The difficulty has more than one dimension. First, identification is a specification problem

To repeat, the issue examined centers upon whether the manufacturing sector's contribution to aggregative velocity movements can be more fully explained by a switching between cash and non-cash liquid assets or by a movement out of both of these assets as market rates of interest rise.

However, Lee contends that a regression of the government securities account on interest rates will yield a spurious negative interest rate coefficient due to a "well-known negative correlation between bond price and its yield" [38, p. 129]. Specifically, as market rates of interest rise the value of the government securities account is expected to decline, ceteris paribus. Thus a regression of

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rather than a statistical problem, i.e., the statement of the relations in theory in the form of a set of equations. An identified structural relation is such that its parameters may be uniquely determined (to a factor of proportionality) from the reduced form coefficients. The statistical problem centers on obtaining estimates of structural parameters with desirable properties, given the parameters are identifiable. For a detailed discussion and statement of the meaning and requirements for identification, see Johnston [31, pp. 352-372] and Wonnacott and Wonnacott [55, Ch. 8 and Ch. 18, pp. 345-353]. Alternatively specification concerns the proper statement of the relations as they exist in the real world. It may be that the relations of theory are correctly specified, but the theory is a misspecification of the real world. Further, most economic theories have not evolved as an explicit set of equations so that the specification of the equations involves the investigator's interpretation of theory with the result that specification is itself a debatable issue. This point is clearly illustrated by Leijonhufvud's conclusion [41] that Keynesian economics and the economics of Keynes are quite dissimilar and by the criticism of Friedman's comparison [19] of the monetarists and the Keynesians [2, 53, 5, 45, and 20].

this account on interest rates would produce a spurious negative interest rate coefficient. Further, a regression of ratios such as cash to government securities on interest rates would also produce spurious regression coefficients. These regression results are spurious, according to Lee, since the sign of the regression coefficient implies nothing about economic behavior, but rather the sign is the result of a mechanical relationship between the market value of fixed-claim financial assets and their market yield.

The prospect for spurious regression results requires attention since others (Ch. 1) have interpreted the regression of ratios, e.g., cash to government securities, to suggest that Keynesian liquidity preference theory cannot explain the liquidity preference decisions of manufacturing corporations. Further, the empirical contribution of this essay relies upon an analysis of the rate of change of such financial ratios during a period of rising interest rates.

4.2 The Interest Rate, Bond Value Problem

Of present concern are the prospects for obtaining spurious regression results from an analysis of the balance sheet data for manufacturing corporations.[3] However, to place the interest rate, bond value relation in perspective it is necessary to start from a more general frame of reference. After a demonstration of the a priori relationship between bond values and interest rates, the effect of this relation on the analysis of balance sheet data is shown to depend upon (1) the average maturity of the government securities portfolio, (2) the stability of this average, and (3) the mode of recording bond values on balance sheets, i.e., whether the balance sheet value of bonds is changed to reflect interest rate changes.

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[3] Though the issue examined here emphasizes the empirical aspects of an inverse relation between interest rates and bond values, this relation also has important implications for alternative views found in theory (Sec. 2.2 and Sec. 3.2).

The bond value, interest rate relation. Based upon the assumption that the bond market is in equilibrium (i.e., supply price equals demand price), the present value (PV) of a bond is equal to its market value. The present value of a bond yielding constant interest payments of R dollars per year and having a maturity value of F after the elapse of n years is given by the usual discounting formula:

$$PV = \sum_{j=1}^{n} \frac{R_j}{(1+i)^{j-t}} + \frac{F}{(1+i)^{n-t}}, \qquad (7.0)$$

where (j-t) > 0, i is the market rate of interest appropriate for discounting, and n is the number of years of life left for this security at time t (t=0).[4] The effect of changes in the market rate of interest (i) on the present value of the fixed-claim asset portrayed in equation (7.0) may be readily shown to depend upon the time to maturity (n) of the asset. The demonstration is made easier if one assumes that interest payments (R) are compounded continuously.[5] Based upon the assumption of continuity, equation (7.0) may be rewritten

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[4] This notation means that the terms of the equation

$$PV = \int_0^n Re^{-it}\ dt + Fe^{-in}. \tag{8.0}$$

Evaluation of equation (8.0) gives

$$PV = \frac{R}{i}\ [1-e^{-in}] + Fe^{-in}. \tag{8.1}$$

The interest elasticity of the present value of the return stream given in equation (8.0) is

$$\frac{EPV}{Ei} = \frac{i}{PV} \cdot \frac{dPV}{di}. \tag{9.0}$$

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with exponential values less than zero (i.e., $j-t<0$) are not a part of the function. Note also that at time $t = 1$ the first term drops out since the first interest installment (R_1) is due and payable. The time index $t = 1$ is then applicable to the next year. A point not considered by Lee involves a relationship between the market value of a bond, the average maturity of a portfolio and time. Based upon equation (7.0), as time passes (i.e., $t \to n$) the maturity of the security shortens and the present value of the security approaches its maturity value (F) as a limit. This result suggests two things. First, in order to maintain a portfolio of a given average maturity, securities must be purchased with a maturity at least as long as the average maturity. Second, a reduction in the market value of a fixed-claim asset due to a rise in market rates of interest is not permanent since the present value of the asset approaches its maturity value as a limit as time passes. For a numerical example of this point see Frazer [18, p. 61].

[5] The assumption of continuous compounding is of course unrealistic. However, the conclusions do not depend upon this assumption. The continuity assumption only makes the analysis simpler.

Next, taking the derivative of equation (8.1) with respect to i and substituting the result into equation (9.0) gives

$$\frac{EPV}{Ei} = \frac{i}{PV} \left[\frac{R}{i^2}\left(\frac{1 + in}{e^{in}} - 1\right) \frac{-nF}{e^{in}}\right]. \tag{9.1}$$

Furthermore, if one assumes that the coupon rate of interest is initially equal to the market rate of interest, then

$$R = iF. \tag{9.2}$$

The substitution of the left-hand member of equation (9.2) into equation (9.1) provides an interpretable form of the interest rate elasticity of present value as

$$\frac{EPV}{Ei} = \frac{F}{PV} [e^{-in} - 1] < 0. \tag{9.3}$$

The value of the interest rate elasticity given by equation (9.3) is less than zero since F and PV $>$ 0 and 0 $< e^{-in}$ for $n > 0$.

Furthermore, since

$$\text{limit } (e^{-in} - 1) = -1, \text{ as } n \to \infty,$$

the interest elasticity of the return stream for a fixed claim asset becomes more negatively interest rate elastic the longer the time to maturity of the asset, and reaches an absolute value of unity at about n = 3, given the hysterical range of interest rates in the United States.[6]

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[6] This point is intuitively obvious from an inspection of equations (7.0) and (8.0). The shorter is the time to maturity the fewer terms are contained in the first term of equation (7.0) and the smaller is the value of the integral of equation (8.0). This means that the near-term maturity value dominates the present value of the return stream. Also,

The above analysis clearly demonstrates the presence of an a priori inverse relationship between the market value of outstanding bonds and market rates of interest.[7] Furthermore, it has been shown that the interest elasticity of the market value of outstanding bonds becomes more negative the longer the time to maturity of the bond. However, it does not follow that this a priori inverse relationship between the market value of outstanding bonds and market rates of interest will produce an inverse relationship between the balance sheet value of a bond portfolio and market rates of interest. The extent to which an increase (decrease) in market rates of interest will result in a decrease (increase) in the balance sheet value of a bond portfolio depends initially upon alternative methods of recording bond values on a balance sheet as explained below.

Recording methods. There are a number of methods for recording bond values on balance sheets. Among these are: (1) bond values may be recorded at their par value, (2) bond values may be recorded at their market value (or

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since the maturity value is large numerically relative to the value of the interest rate, the ratio of F to $(1 + i)^{n-t}$ or F to e^{in} would change little as interest rates change, and thus present value would change little as the interest rate changes the shorter the term to maturity of the asset.

[7] An outstanding bond is one which has been issued and absorbed in portfolios but has not matured. A bond which is currently being offered on the market for the first time is called a new issue. It is argued below that an assessment of Lee's proposition also depends upon whether the asset holder purchases an outstanding bond (previously held by some other asset holder) or a new issue.

cost) with no adjustment in balance sheet values until the bond is sold, and (3) bond values may be recorded at their market value (or cost) with periodic adjustment of balance sheet values to reflect changes in the market value of bonds.

In the first instance there would be no ceteris paribus relationship between the balance sheet value of a bond portfolio and market rates of interest. In the second instance there may be some inverse relationship between the balance sheet value of a bond portfolio and market rates of interest. The inverse relationship in this case is, however, somewhat subtle. For example, at a time when market rates of interest are rising and outstanding issues of bonds are absorbed into the portfolios of individual asset holders, the value of the bond portfolio would rise less than it otherwise would have had interest rates not been rising.[8] The effect of the interest rate,bond value relationship on regression coefficients in this instance would be to reduce these coefficients (e.g., interest rate coefficients) in absolute size rather than to predetermine their algebraic sign. It is the third method of recording balance sheet values which offers the greatest prospect for spurious regression results of the sort suggested by Lee. The third method of recording includes the effects due to the second recording method as well as the effect of periodic revaluation of the bond portfolio. To repeat, as market rates of interest rise (fall) and market value of outstanding bonds fall (rise), the balance sheet value of the bond portfolio is decreased (increased) periodically in this instance.

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[8] This result is based upon the assumption that the trading in bonds would have occurred in the absence of rising interest rates.

It is the condition of periodic revaluation of the bond portfolio which leads most directly to the prospect that a regression of the balance sheet value of a bond portfolio on market rates of interest may produce a spurious negative correlation. However, even in this instance the spurious regression result may not follow.

The reason the spurious result does not necessarily follow is straightforward. Given the periodic revaluation of bonds held in the portfolio, the total value of the portfolio will clearly vary inversely with market rates of interest, if no additional bonds are absorbed into the portfolio. However, if additional bonds are absorbed and others sold as the revaluation occurs between two points in time, it is an extreme prospect that the total value of the portfolio will decline spuriously as market rates of interest rise.[9] Furthermore, if the additional bonds absorbed into the portfolio are new issues, there may be no decline in the total value of the bond portfolio in an opportunity sense. If, for example, the new issue of bonds pays a coupon rate of interest which is equal to the prevailing market rate of interest for this class of bond, the market value (or cost) of the bond will equal the par value of the bond.

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[9] Of course, the total value of the portfolio could decline in an opportunity sense, as suggested previously.

In conclusion, the prospect for spurious regression results of the sort suggested by Lee depends upon (1) the average time to maturity of the bond portfolio, (2) the degree to which additional bonds are absorbed (or sold) into (out of) the portfolio and whether the bonds acquired are new or outstanding issues, and (3) the method of recording bond values on balance sheets. The most likely prospect for spurious results is given by (1) a long average time to maturity, (2) an acquisition (sale) of bonds into (out of) the portfolio of total value less than in proportion to the reduction (increase) in value of the bonds retained in the portfolio as market rates of interest rise (fall), and (3) the balance sheet value of the portfolio is periodically revalued as market rates of interest change.

The case of manufacturing corporations. The importance of the interest rate, bond value relationship in this study concerns specifically the balance sheet accounts reported by the FTC-SEC for manufacturing corporations. The FTC-SEC does not provide any information with respect to the government securities account which can be used to assess the effect of changes in market rates of interest on the value of this account. However, information may be obtained elsewhere.

Jeffers and Kwon [29, p. 911] report that recent Treasury surveys of ownership and maturity distribution of corporate holdings of government securities showed that between 75 to 85 per cent of corporate holdings have less than one year to maturity. In addition, Terrell and Frazer [49, p. 27] report that the maturity distribution of government securities held by non-financial corporations had a mean maturity of 14.4 months and a standard deviation of 22.2 months with considerable positive skewness.[10] While separate data are not provided for the special class of manufacturing corporations, it is clear from the evidence reported in these studies that the maturity distribution for this special class of firms cannot differ much from that of non-financial corporations in general. Terrell and Frazer [49, p. 19] also report that the maturity profile for government securities remained stable for non-financial corporations, as well as for other institutional groups during the period of their study. Again, due to the consistency of these results for various institutional groups, there is no reason to assume that manufacturing corporations deviated from this pattern.

Conventional accounting practice for recording the value of short-term financial assets reduces still further the likelihood of a spurious regression result. It is conventional to record short-term financial assets at the lower of cost or market value with no periodic adjustment in these balance sheet values as market values change.[11] Revaluation of balance sheet values is reserved for what is termed long-term investments. Even here the revaluation is done only if it is thought that the change in market value is reasonably permanent.

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[10] Terrell and Frazer analyzed data for government security holdings valued at par contained in the United States Treasury's Survey of Ownership for the period 1960-69.

4.3 The FTC-SEC Accounts

With the exception of the cash and government securities accounts, the balance sheet accounts reported by the FTC-SEC are largely self-explanatory.[12] Prior to 1964 the cash and government securities accounts had essentially their generic meaning. However, starting with the first quarter of 1964 the FTC-SEC reorganized its method of reporting these accounts. The reorganization was due to the rise in importance of financial instruments such as certificates of deposit (CDs) in the portfolio of manufacturing corporations [e.g., 46 and 47] and due to non-uniform reporting of these assets and others by firms. Further, CDs have been increasingly substituted for government securities (in the generic sense) in the portfolios of nonfinancial corporations during the 1960s [46]. The essence of the reorganization was to move CDs from the government securities and other assets accounts to the cash account.

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[11] For a discussion of conventional accounting procedures for adjusting balance sheet values for changes in market values, see Accounting Research Bulletin, No. 43, 1953, chapter 3. This journal is published by the American Institute of Certified Public Accountants.

[12] Possible exceptions are the accounts for receivables and payables. The former is primarily trade credit extended to other firms (or segments of the economy) and the latter is primarily trade credit received from other firms.

The data incompatibilities produced by the FTC-SEC reorganization may be resolved in a number of ways. For example, one could apply the adjustment factors suggested by the FTC-SEC to the data prior to 1964 or their inverse to the data starting with 1964.[13] The adjustment of the post-1963 data [17, p. 81] has the advantage of retaining the generic meaning of the cash and government securities accounts. Alternatively, one could examine the data prior to 1964 separately from those starting with 1964 and allow for the difference in asset aggregates in the interpretation of results.

A disadvantage to adjusting the data by the FTC-SEC's formula is that it assumes that all asset size classes of firms hold CDs in equal proportion with respect to government securities and other assets. Although, there is no direct evidence on the point, this is an a priori questionable assumption. Since the larger firms hold proportionately more government securities than the smaller firms [11, Ch. 15], it seems reasonable that their holdings of CDs would also depend upon asset size. For example, CDs may be obtained easily with no transactions cost at the commercial bank (or banks) where the firms regularly hold their demand deposits. On the other hand, the acquisition of government securities (e.g., Treasury bills) may require entry into the capital market and the payment of brokerage fees.[14] In essence, the idea is that CDs are more readily accessible to firms than are governments and require less knowledge of financial markets than is the case with governments. If this is the case, then the smaller firms may hold more CDs relative to their government securities holdings than the larger firms. In any event, it was deemed preferable to adjust the post-1963 data by the inverse of the FTC-SEC's formula to maintain the generic meaning of the terms "cash" and "government securities."

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[13] The FTC-SEC suggests raising cash by 15 per cent and lowering government securities and other current assets by 5 per cent and 15 per cent, respectively, for the data prior to 1964 as a means of making the data approximately comparable.

4.4 Summary

The empirical implications of an a priori inverse relation between the market value and market yield of fixed-claim assets (e.g., government bonds) has been evaluated in terms of the analysis of the balance sheet data for manufacturing corporations. Also considered were the effects on the interpretation of asset aggregates arising from the FTC-SEC's reorganization of the reported data in 1964.

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[14] However, large firms could deal directly with government securities dealers who buy and sell at market rates of interest which would involve no brokerage fee as such. If a local bank purchases governments for a small firm (or sells them some of its own holding), there may again be no brokerage fee.

Viewed empirically it was argued that Lee's contention that the a priori relation between bond values and yields predetermines the algebraic sign of certain regression coefficients is not a likely consequence in the case of the balance sheet data for manufacturing corporations. This conclusion is based mainly on two facts. First, the manufacturing sector's holdings of government securities have a short average maturity. The shorter the average maturity of a bond portfolio, the less is the absolute value of the interest rate elasticity of the total value of the portfolio. Second, conventional accounting practice is to record short-term financial assets at the lower of cost or market value with no periodic adjustment of these balance sheet values as market values change.

Appendix to Chapter 4

The meaning of regression coefficients obtained from a regression equation involving rates of change is outlined below. This information will provide the basis for interpreting the results from analysis of data which follows in

Chapter 5. The percentage rate of change of a variable X may be denoted as

$$\frac{1}{X} \cdot \frac{dX,}{dt}$$

where t is a time index. If dt = 1, then

$$\frac{dX}{X} = \frac{W_t - X_{t-1},}{X_{t-1}}$$

which is the empirical measure of a one-period percentage rate of change. Information concerning the average growth of a time series can be obtained from a log-linear regression of the form

$$\ln X = Bt + e,$$

where ln denotes a natural logarithm, A and B are regression coefficients, t is a time-trend variable with values 1, 2, 3, ... , and e is an error term. A differentiation of relations (10.0) with respect to the variable t yields:

$$\frac{d(\ln X)}{dt} = B.$$

But since

$$\frac{d(\ln X)}{dr} = \frac{d\ln X}{dx} \cdot \frac{dX}{dt} = \frac{1}{X} \cdot \frac{dS}{dt} = B, \tag{10.0}$$

the coefficient of the variable t in relation (10.0) represents the average percentage rate of change of the variable X over the sample period of regression.

Further, if the variable on the left-hand side of relation (10.0) is replaced by the logarithm of the ratio of two variables, the regression coefficient represents the difference in the average percentage rates of change of the two variables. This can be easily shown by differentiating

$$\ln\frac{X}{Y} = C + Dt + e \qquad (11.0)$$

with respect to t, which yields

$$\frac{d\ln \frac{X}{Y}}{dt} = D. \qquad (11.1)$$

But since

$$\frac{d\ln \frac{X}{Y}}{dt} = \frac{d\ln X}{dt} - \frac{d\ln Y}{dt} = \frac{1}{X}\frac{dX}{dt} - \frac{1}{Y}\frac{dY}{dt} = D, \qquad (11.2)$$

the regression coefficient D of equation (11.0) equals the difference in the average growth rates of the variables X and Y.

The application of relation (11.0) in the analysis of the data for manufacturing corporations is aided by the balance sheet identity; i.e., total assets equal the sum of the separate asset aggregates. For example, a regression of the ratio of cash to sales on a time trend indicating a decline in cash balances in relation to sales implies differential rates of growth for the cash and sales variables. Specifically, drawing upon relation (11.2) this result would indicate that sales have grown at a faster rate than cash. Further, if the growth in sales is taken as a proxy for total asset growth, this result would indicate that some other aggregate (or aggregates) has grown faster than total assets, e.g., instrumental capital. While other examples could be offered, the point is that due to the balance sheet identity information about changes in the liquidity structure of firms, information is implied about inventories and capital investment even though data for the latter are not explicitly analyzed.

CHAPTER 5

FINANCIAL ADJUSTMENTS: RESULTS FROM ANALYSIS OF DATA

5.1 Introduction

The objective is to provide some additional evidence upon which to evaluate the empirical relevance of the two hypotheses of Section 1.1. These hypotheses have been shown to follow from alternative liquidity preference theories (Sec. 2.2 and Sec. 3.2) and from alternative interpretations of the empirical evidence--especially as this evidence concerns the financial adjustments of non-financial corporations (Sec. 1.1). Specifically, the question is whether during periods of expanding business activity, such as those of the 1960s and early 1970s, one can best account for the manufacturing sector's contribution to a rise in aggregative velocity by (1) a movement out of cash into the liabilities of intermediaries or government securities or (2) a movement out of cash and non-cash liquidity assets in general.[1]

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[1] The expansion of the 1960s was not uninterrupted. The National Bureau of Economic Research's turning points are May 1960 (peak), February 1961 (trough), November 1969 (peak), and November 1970 (trough). There was also the so-called mini-recessions of 1966-67.

5.2 Analysis of the Data

The two hypotheses under investigation suggest different patterns for the percentage rates of change of the cash and government securities accounts in particular. The theory underlying Hypothesis 2 also involves notions concerning the rates of change of other balance sheet accounts, e.g., bank loans, during a period of expanding business conditions. However, the fundamental difference in the two liquidity preference theories from which these hypotheses evolve--in the sense of empirical observations--centers on the pattern of movement of the cash and government securities accounts in relation to interest rate movements. Traditional Keynesian liquidity preference theory envisions marginal adjustments from cash into government securities as interest rates rise, as indicated by Hypothesis 1, whereas a revision of Keynes' theory envisions marginal adjustments out of both accounts during such periods, as indicated by Hypothesis 2. In the latter theory expectations concerning the flow of income to instrumental capital are largely responsible for the expected pattern of movement (Sec. 3.3). In the former theory such expectations are held constant and notions concerning changes in the market value of fixed-claim financial assets are largely responsible for the expected pattern of movement (Sec. 2.2).

A comparison of average growth rates provides a simple means of testing these notions as a first approximation.

The cash, government securities, and bank loan accounts were regressed on a linear time trend to obtain an estimate of the average growth rate for these accounts (Appendix to Chapter 4) for firms classified by asset size.[2] A positive average growth rate for cash holdings and a negative average growth rate for government security holdings for most asset-size classes of firms are revealed by an examination of the data in Table 5.1. The disinvestment in governments was substantially greater than the rate at which cash balances were accumulated, with the exception of the very largest firms which accumulated both cash and governments during the 1960-64 period and disinvested in the latter during the 1965-72 period.[3] The fact that cash was in general accumulated at a slower rate than governments were liquidated--

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[2] The FTC-SEC reports data for firms with assets of (1) under $5 million, (2) between $1-$5 million, (3) between $5-$10 million, (4) between $10-$25 million, (5) between $25-$50 million, (6) between $50-$100 million, (7) between $100-$250 million, (8) between $250-$1,000 million, and (9) over $1,000 million. An adjustment in these data such that the generic meaning of the cash and government securities accounts is retained for the post-1963 data was explained in Section 4.3.

[3] The firms in asset-size class 4 disinvested in both cash and governments during the entire 1960-72 period, whereas firms in asset size class 6 disinvested in cash only during the 1960-64 period. In general, the smaller firms hold proportionately more (less) cash (governments) than the larger firms with the peak for cash holdings occurring for size class 3 [17, 10, pp. 202-212, and 11, Ch. 15]. Consequently, the results shown for size class 4 may reflect a growth in the firm's total assets such that fewer firms are included in size class 4 over time.

TABLE 5.1

Percentage Annual Average Growth Rates for Cash, Government Securities and Bank Loans

Asset Size	Period 1 (1960:1-1964:4) Cash	Period 1 (1960:1-1964:4) Government Securities	Period 1 (1960:1-1964:4) Bank Loans	Period 2 (1965:1-1972:4) Cash	Period 2 (1965:1-1972:4) Government Securities	Period 2 (1965:1-1972:4) Bank Loans
1	4.4	- 3.2	4.4	2.0	-10.8	3.6
2	0.4	- 2.4	2.0	1.6	-10.0	4.4
3	0.4	- 4.0	5.2	2.8	- 7.2	4.0
4	- 1.6	- 1.2	1.6	- 0.8	-12.8	4.0
5	0.0	- 3.2	6.4	0.4	-10.8	6.0
6	- 3.2	- 9.6	- 3.6	1.6	- 8.8	6.0
7	1.6	- 7.2	1.2	2.0	-19.2	8.8
8	2.0	-10.0	- 7.2	4.4	- 9.6	11.6
9	10.0	6.4	21.6	10.8	- 7.2	33.2

Source: Federal Trade Commission: Securities and Exchange Commission, Quarterly Financial Report.

expecially during the 1960-64 period of stable interest rates[4]--means that the reduction in governments cannot be explained by an increase in cash holdings. The continued disinvestment in governments while interest rates were rising rapidly during the 1965-72 period clearly fails to support the switching notions of Keynesian liquidity preference theory and Hypothesis 1. Alternatively, the revised theory of Keynes and Hypothesis 2 call for a reduction of cash and government security holdings in relation to other assets (or sales) during a period of expanding business conditions such as that considered here. Moreover, the reduction in these accounts (and liquidity broadly viewed) is expected to be greater during the latter stages of the expansion with an initial build-up of liquidity--at least for the larger firms--during the early stages of the expansion. While difficult to fully assess by a comparison of average growth rates, the evidence in Table 5.1 provides some support for the notion of an initial build-up of liquidity by the larger firms in the early stages of an economic expansion, followed by a reduction in liquidity as the economic expansion matures. During the 1960-64 period, only the very largest firms (i.e., asset size group 9) increased both their holdings of cash and government securities. Further, during the latter stages of the economic expansion (the 1965-72 period) the larger asset size classes of firms (i.e., asset size classes 7, 8, and 9) not only disinvested in governments, but substantially increased their reliance on bank loans as a source of funds. All of these changes are consistent with Hypothesis 2 and the revision of Keynes' theory.

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[4] Average interest rates were stable prior to 1965 and rose rapidly thereafter. For example, the market yield on United States Treasury bills, as reported in the Federal Reserve Bulletin, rose from an average level of 2.1 per cent during the 1960-64 period to an average level of 5.0 per cent during the 1965-72 period, as a quarterly average of daily rates. Similarly, the Aaa corporate bond rate rose from an average of 4.3 per cent to an average of 6.4 per cent for the same periods.

Since the matters presently considered concern proportionate changes in cash, government securities, and bank loans in relation to sales or total assets rather than absolute changes in these accounts, additional evidence is provided by a comparison of the average growth rates for these accounts in relation to sales growth. Indicators for these differential rates of growth were obtained by regressing each account as a ratio to sales on a time trend, after a logarithmic transformation of the data (Appendix to Chapter 4). The pattern revealed by these indicators for differential growth rates also provides support for Hypothesis 2 over Hypothesis 1. In particular, an examination of the average growth rates for these accounts in relation to sales growth, as shown in Table 5.2, indicates that with the exception of the very largest firms (i.e., asset size group 9) and asset size classes 1 and 4 the rate of decline of cash balances in relation to sales slowed

TABLE 5.2

Percentage Annual Average Growth for the Ratios of Cash, Government Securities, and Bank Loans to Sales

	Period 1 (1960:1-1964:4)			Period 2 (1965:1-1972:4)		
Asset Size	Cash / Sales	Government / Sales	Bank Loans / Sales	Cash / Sales	Government / Sales	Bank Loans / Sales
1	-1.2	- 9.2	- 1.2	1.6	-11.2	3.2
2	-4.8	- 7.6	- 3.2	-1.2	-13.2	1.2
3	-5.6	- 9.6	0.0	-0.4	-10.4	0.0
4	-0.4	- 3.2	- 0.4	-4.0	- 0.4	0.8
5	-6.0	- 9.2	0.4	-2.0	-13.2	3.6
6	-5.2	-12.0	- 6.0	-0.8	-10.8	3.6
7	-3.2	-12.0	- 3.6	-2.4	-21.2	4.4
8	-3.2	-15.6	-12.8	-0.4	-14.4	6.8
9	-2.0	- 5.6	10.0	-4.0	-22.0	18.4

Source: Federal Trade Commission: Securities and Exchange Commission, Quarterly Financial Report.

in the period 1965-72 relative to the period 1960-64. Further, the rate of decline of governments increased (except for size-classes 4, 6, and 8) in relation to sales as the expansion of business activity continued and the reliance on bank loans as a source of short-term funds increased. This pattern is especially evident for the larger size-classes of firms (i.e., asset-size-classes 7 and 9). In other words, these results indicate that during the latter stages of the business expansion of the 1960s the larger firms in particular increasingly satisfied the need for funds--including those needs arising from the expansion of instrumental capital--by a disinvestment in government securities and by increasing their reliance upon bank credit as a source of funds.[5]

The relation between adjustments in cash holdings, government securities, liquidity broadly viewed, and planned capital expenditures can be illuminated by an examination of correlation coefficients such as those in Table 5.3. For the full period of analysis these correlation

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[5] A regression of the logarithm of planned capital expenditures on a time-trend variable showed that anticipated capital expenditures increased at an average annual rate of 4.0 per cent from 1965:1 to 1972:4 for all manufacturing using the Department of Commerce data as compared to an average annual rate of increase of 6.0 per cent between 1960:1 to 1964:4. Capital expenditure data for firms are not available according to the asset size of firms.

TABLE 5.3

Matrix of Correlation Coefficients
(1960:1-1972:4)[a]

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	PCE	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
G_1	-.61									-.59									
G_2		-,67								-.76									
G_3			-.09							-.92									
G_4				-.05						-.94									
G_5					-.47					-.93									
G_6						.34				-.94									
G_7							-.46			-.95									
G_8								-.72		-.71									
G_9									-.71	-.81									
PCE											-.77	-.84	-.93	-.95	-.92	-.94	-.96	-.90	-.90

Sources: The Federal Trade Commission: Securities and Exchange Commission, Quarterly Financial Report is the source for all data except planned capital expenditures. Planned capital expenditures data were obtained from the U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business.

[a] The C_i's are cash balances for each of the asset size class of firms (i=1,2,...,9), the G_i's are government security holdings, the L_i's are the ratios of cash plus Government securities to bank loans and PCE is planned capital expenditures in the current quarter.

coefficients show a negative association between cash and government securities which initially becomes weaker as the firms increase in size and then becomes stronger for size-groups 7, 8, and 9.[6] Such a pattern is to be expected, based upon the evidence from an analysis of the cross-section data [17; 10, pp. 202-212; and 11, Ch. 15]. These analyses of the cross-section data reveal that the smaller firms hold proportionately more (less) cash (governments) than the larger firms, with the peak for cash holdings occurring for asset size class 3.

In terms of the two hypotheses presently considered such a negative association between the cash and government securities accounts is implied by Hypothesis 1. However, the previous examination of average growth rates revealed that this negative association is due to a movement out of governments and cash in relation to sales, as is implied by Hypothesis 2, and an absolute decline in government security holdings. Further, these correlation coefficients reveal that the disinvestment in governments is increasingly correlated with the increase in planned capital expenditures for all manufacturing firms as the firms increase in asset size. The greater negative correlation between governemnts and planned capital expenditures occurs for firms in asset size group 7 and declines somewhat thereafter. The weakening of this relation for the two largest-size groups of firms may be attributed to the increased reliance on bank loans by large firms as a short-term source of funds during the latter stages of the economic expansion. The increasingly negative association between liquidity (i.e., the ratio of cash plus governments to bank loans) and planned capital expenditures supports this interpretation of the data.[7]

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[6] The correlation coefficient for firms in asset size-group 6 is an exception. This positive coefficient may be the result of an absolute decline of both cash and governments for these firms during the period 1960-1964. Also, the extremely weak relation (though negative) for asset size class 4 may be due to a weakness in the data as suggested in explanatory note 3.

5.3 Summary

The results from the analysis of data for the manufacturing sector provide support for Hypotheses 2 over Hypothesis 1. These results, moreover, suggest that expectational phenomena concerning changes in the flow of income to instrumental capital are manifest in the financial adjustments of these firms. Possibly the most important evidence in support of these conclusions is revealed by the average growth rates for cash, government securities, and bank loans and their relation to the rate of growth of planned capital outlays. During the prolonged capital boom of the 1960s and early 1970s, manufacturing firms disinvested in government securities even though interest rates rose rapidly during the latter part of this period. Clearly, the manufacturing sector's contribution to aggregate movements of the income velocity of money cannot be attributed to a switching between cash and non-cash liquid assets as suggested by traditional Keynesian liquidity preference theory.

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[7] Frazer [15] provides additional evidence of the relation between liquidity and capital expenditure plans, using FTC-SEC industry data and the National Industrial Conference Board's data on capital expenditure plans. These results show a positive log-linear relation between liquidity and the backlog of capital expenditures (i.e., capital appropriations less actual capital expenditures). A test of asset-size effects using industry data is supported by other work (note 3), wherein the industry data were converted to a per-firm basis. The analysis of these converted data shows that, at least in the present context, asset-size effects dominate over industry effects such that one gets the same results with either data arranged by asset size of firms or by industry when recognition is given to the average size firm per industry.

In general, the results of analysis of data for the manufacturing sector conflict with the interpretations of Latané, Lee, and others following their analysis of aggregative data for the whole economy wherein little consideration is given to the special needs of different sectors and the financial and non-financial character of the business sector. The results presented in this chapter suggest that the liquidity and portfolio adjustments more broadly viewed for each sector (or subsector) should receive separate analysis with careful consideration given to the special needs of each arising from the liability side of the balance sheet.

The more refined implications of a dynamic liquidity preference theory, such as that offered by Frazer, are difficult to assess. However, the present analysis--relying mainly on an analysis of average growth rates--does provide some insight in this regard. For example, there is some evidence that the larger firms allow liquidity to build up during the initial stages of a cyclical expansion of business activity as suggested by dynamic theory. Further, as the expansion continues, the evidence indicates that the larger firms draw down their stores of liquidity by disinvesting in governments, and increasingly rely upon bank loans as a source of funds on short notice to meet unforeseen contingencies. All of these changes are occurring as capital expenditure plans are being implemented and thus require proportionately larger amounts of funds.

CHAPTER 6

SUMMARY

The conflicting views examined in the present work center about the sort of adjustments in the holding of highly liquid assets and certain liabilities (e.g., bank loans) one expects to observe on the part of manufacturing corporations as changes occur in the economic environment of the corporations. As a part of matters considered is the issue of the role of expectational phenomena in influencing decisions by corporate managers concerning liquidity preference.

The interest in the state of liquidity as it pertains to manufacturing corporations stems from conflicting views found in the theory of liquidity preference as well as from conflicting interpretations of the empirical evidence. In particular, the interpretations of the empirical evidence found in the empirical literature are varied in terms of explaining the chain of causation between interest rate movements and movements in the income velocity of money--especially so as this evidence concerns manufacturing corporations (Sec. 1.1). Differences arise in these results due to both weaknesses in the empirical analyses and alternative theoretical structures. In some cases the analysts fail to distinguish between changes in the levels of variables and changes in rates of change of variables. Moreover, there is a tendency to draw conclusions about the liquidity adjustments of non-financial corporations, without actually examining the data on liquidity except for the liabilities of financial intermediaries.

Alternative constructs of received liquidity preference theory also account for some of the different interpretations of the empirical evidence. Alternative liquidity preference theories were reviewed and related to two rather simple hypotheses (Chapter 1). In this way, the main streams of thought in the theory of liquidity preference were analyzed with a view toward forming a frame of reference for viewing the empirical evidence. Stated briefly, the two aforementioned hypotheses were found to correspond loosely with Leijonhufvud's dichotomy between Keynesian and Keynes' liquidity preference theory. Initially, this dichotomy stems from alternative interpretations of the asset aggregates of Keynes' theory as viewed by Leijonhufvud. One body of theory involves assets with a fixed claim against future income flows, and another theory involves these assets and assets with a residual claim against future income flows. In the present view it is the constancy of the state of expectations in orthodox Keynesian theory which limits the theory as an explanation of real-world events, e.g., the portfolio adjustments of manufacturing corporations.

The liquidity preference theory of Frazer as reviewed in Section 2.2 and embellished in Section 3.2 freed expectations from their impoundment in ceteris paribus. That is, the alternative liquidity preference theory revises Keynes' theory to encompass dynamic phenomena falling within the purview of expectations and includes regression pulls, extrapolative pushes, shocks, and the modern notions found in Fellner's theory of semiprobabilistic behavior. Frazer utilizes these notions to provide insight with regard to the extent to which behavioral units are guided by possible returns to normal values or by growing deviations from normal values.

As a means for directly relating the foregoing to the liquidity decisions of manufacturing corporations as distinct from purely financial corporations, the balance sheets of each type of institution were examined (Sec. 2.2) and a theory of the balance sheet for non-financial corporations was presented (Sec. 3.2). This theory provides an explanation for the portfolio adjustments of these institutions, wherein the balance sheet is viewed as reflecting a number of objectives, e.g., liquidity and income objectives. Expectational phenomena predominate in this theory. In essence it is argued that in such a setting liquidity is built up during periods of slow growth as bank loans are reduced and funds are accumulated from other sources, e.g., depreciation. These funds are held in bank deposits and short-term financial assets as capital expenditure plans are deferred. As expectations change (e.g., because of an adaptation of expectations and learning from experience, influences emanating from the monetary or fiscal authority, or because of dynamics internal to the system of analysis) and slanting inclinations change, the flows of prospective and probabilistically weighted returns from possible additions to instrumental capital generally change. There follows an increase in planned capital expenditures, and previously built-up stores of liquidity may serve as a means of partially financing these expenditures. As the economic expansion continues and matures, temporary funds are increasingly sought from such sources as short-term bank loans, at least by the larger firms.

The data for manufacturing corporations were examined as a means of resolving, at least partially, the conflicting interpretations of the empirical evidence as it pertains to this sector of the economy. Further, this evidence forms a basis upon which to evaluate the empirical relevance of the two hypotheses and the alternative liquidity preference theories from which they are derived.

Overall, the empirical analysis relies upon simple methods with emphasis on a comparison of differential rates of change. The empirical results presented in Section 5.2 provide support for Hypothesis 2 over Hypothesis 1. These empirical results suggest that expectational phenomena centering on changes in the prospective income flow to instrumental capital are manifested in financial adjustments of manufacturing firms. In particular, the analysis of average growth rates for cash and government securities accounts revealed that, during the prolonged capital boom of the 1960s and early 1970s, manufacturing firms disinvested in government securities even though interest rates rose rapidly during the latter part of this period. This evidence stands in marked contrast to the results reported by Shatto and Stern for all non-financial corporations. These analysts reported that the cyclical movement of non-money liquid assets suggests a movement out of cash and into non-money financial assets during periods of expanding business conditions. Clearly the manufacturing sector's contribution to aggregative velocity movements during this period cannot be attributed to an exchange of cash and government securities. Further, the results of the analysis of the data for the manufacturing sector conflict with the conclusions of Latané, Lee, and Chetty, derived from the analysis of data for the aggregative economy. Latané contends that his evidence supports the proposition that the interest rates velocity association can be explained by a switching between money and bonds. Lee and Chetty present evidence to suggest that Latané's "bonds" may be closely approximated by either savings and loan shares or by commercial bank time deposits. While this evidence may be relevant for, say, the household sector or certain financial institutions, it cannot explain the manufacturing sector's contribution to aggregative velocity movements. The contention of Jeffers and Kwon that capital expenditure plans need not be considered in an effort to explain the liquidity adjustments of non-financial corporations is also questioned by the evidence presented here. While available data limit the investigation in this regard, the inverse correlation between liquidity and planned capital expenditures is strongly suggestive of a relation between these elements of decision making as outlined by Frazer.

Lee's argument that regressions involving financial ratios of the sort present here, and by Frazer, produce predetermined signs for regression coefficients and, in general, spurious results has been dealt with (Sec. 4.2). In brief, Lee's conclusion was found to be based upon his failure to distinguish between the marginal and average effects on the value of a bond portfolio of a change in market rates of interest. In any event, the short-term average maturity of the manufacturing sector's holdings of government securities and traditional accounting practices support the interpretation of the evidence as presented here; namely, the regression coefficients obtained by regressions of financial ratios (e.g., cash plus government securities to bank loans) on a time trend or on interest rates are not predetermined in sign, nor are these results spurious.

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BIOGRAPHICAL SKETCH

Charles Eugene Guy was born February 19, 1936, at Spartanburg, South Carolina. He is married to Patricia Jean Norberg, formerly of Flint, Michigan, and has three children. He received a Bachelor of Arts degree from Wofford College in August 1959 and a Master of Science degree with a major in economics from the University of Alabama in June 1961. From September 1961 to August 1963 he was a member of the Economics Faculty of Auburn University. He was accepted in the Graduate School at the University of Florida in 1964. He served as an instructor in the Economics Department of the University of Florida while pursuing his work toward the degree of Doctor of Philosophy in economics. From September 1970 to August 1972 he was an assistant professor of economics at Auburn University. In September 1972 he joined the staff of the Price Commission in Washington, D.C., where he served as a staff economist until wage and price controls were abolished in April 1974.

He is currently with the Department of Commerce in Washington, D.C., as a research economist.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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